MALHEUR NATIONAL WILDLIFE REFUGE

Burns, Oregon

ANNUAL NARRATIVE REPORT

Calendar Year 1983

NATIONAL WILDLIFE REFUGE SYSTEM

Fish and Wildlife Service

U.S. DEPARTMENT OF THE INTERIOR

Sitting, left to right: 8,14,7
Standing, left to right: 11,12,9,10,4,15,16,6,2,3

PERSONNEL

1. Joseph P. Mazzoni, GS-13, PFT. . . . . Refuge Manager
   TRANSFERRED: 08-06-83 to Regional Office, Anchorage, Alaska
2. Dean F. Knauer, GS-12, PFT . . . . . Assistant Refuge Manager
   EOD: 05-15-83, Acting Refuge Manager, 07-01 to end of year
3. Bradley D. Ehlers, GS-9, PFT . . . . . Assistant Refuge Manager
4. David G. Paullin, GS-11, PFT . . . . . Wildlife Biologist
5. Steven P. Thompson . . . . . Assistant Wildlife Biologist
   TRANSFERRED: 02-05-83 to Nisqually NWR, Olympia, Washington
6. Gary L. Ivey, GS-7, PFT. . . . . Assistant Wildlife Biologist
   EOD: 08-21-83
7. W. Ruth Warneke, GS-5, PFT . . . . . Refuge Assistant
8. Arlene Miller, GS-4, PFT . . . . . Secretary
9. Norman J. Warneke, WL-9, PFT . . . . . Maintenance Leader
10. Marvin L. Jess, WG-10, PFT . . . . . Crane Operator
11. Charles L. Yriarte, WG-9, PFT. . . . . Maintenance Mechanic
12. Clyde R. Miller, WG-9, PFT . . . . . Maintenance Mechanic
13. William R. Aulbach, WG-9, PFT. . . . . Maintenance Mechanic
    DESEASED: 06-21-83
14. Dee Dee Ehlers, GS-3, TEMP/INT . . . . . Clerk-Typist
15. Randy L. Aulbach, WG-5, TEMP . . . . . Maintenance Mechanic Helper
    EOD: 01-23-83 - TER: 12-24-83
16. Glen A. Grindstaff, WG-5, TEMP/INT . . . . . Maintenance Mechanic Helper
17. Larry Grindstaff, WG-5, TEMP/INT . . . . . Maintenance Mechanic Helper
    TER: 10-01-83

18. Carroll D. Littlefield, GS-7, TEMP. . . . . .Wildife Biologist
    EOD: 02-09-83 - TER: 08-06-83 (Volunteer from 10-01)
19. Craig L. Foster, GS-3, TEMP/INT . . . . . .Biological Aide
    EOD: 02-20-83 - TER: 03-19-83
20. Jonathon D. Anderson, GS-4. TEMP/INT. . . . .Biological Aide
    EOD: 02-28-83 - TER: 09-30-83
21. Susan M. Lindstedt, GS-3, TEMP. . . . . .Biological Aide
    EOD: 05-15-83 - TER: 08-06-83 (Volunteer from 08-08)
22. Ellen Kelley,VOLUNTEER. . . . . .Biological Aide
    EOD: 03-16-83 - TER: 10-01-83
23. Tom Johnson, GS-5, TEMP . . . . . .YCC Work Leader
    EOD: 06-02-83 - TER: 08-10-83 (hire through SCA)
24. Shauna Tackman, GS-5, TEMP. . . . . .YCC Work Leader
    EOD: 06-02-83 - TER: 08-10-83 (hire through SCA)

REVIEW AND APPROVALS

George Carter 3/22/84

Submitted by Date

Regional Office Review Date

PREFACE

The 183,684 acre Malheur National Wildlife Refuge is located in the Malheur-Harney Lakes Basin, 32 miles south of Burns, Oregon. The Basin has no outlet to the sea. It encompasses over three million acres and has three major water sources. The Silvies River with headwaters in the Blue Mountains, drains about 1,360 square miles and flows into Malheur Lake marsh from the north. The Donner und Blitzen River heads on Steens Mountain in the southeastern portion of the Basin. It drains a 1,000 square mile watershed and flows into Malheur Lake through the Blitzen Valley from the south. Silver Creek flows directly into Harney Lake through the Upper and Lower Warm Springs valleys from the north and drains a 900 square mile area. Harney Lake also receives water from Malheur Lake during high water years.

In the northern part of the Basin, irrigated native meadows east and south of Burns are important spring migration habitat. Waterfowl, lesser sandhill cranes, and shorebirds use this area extensively on their way north.

In June of 1980, the Harney Basin was included on the Service's national list of Important Resource Problem areas (priority No. 58). This area was included because of the significance of its waterfowl and waterbird habitat within the Pacific Flyway, and because of the potential for loss of these habitat values to changing land use practices.

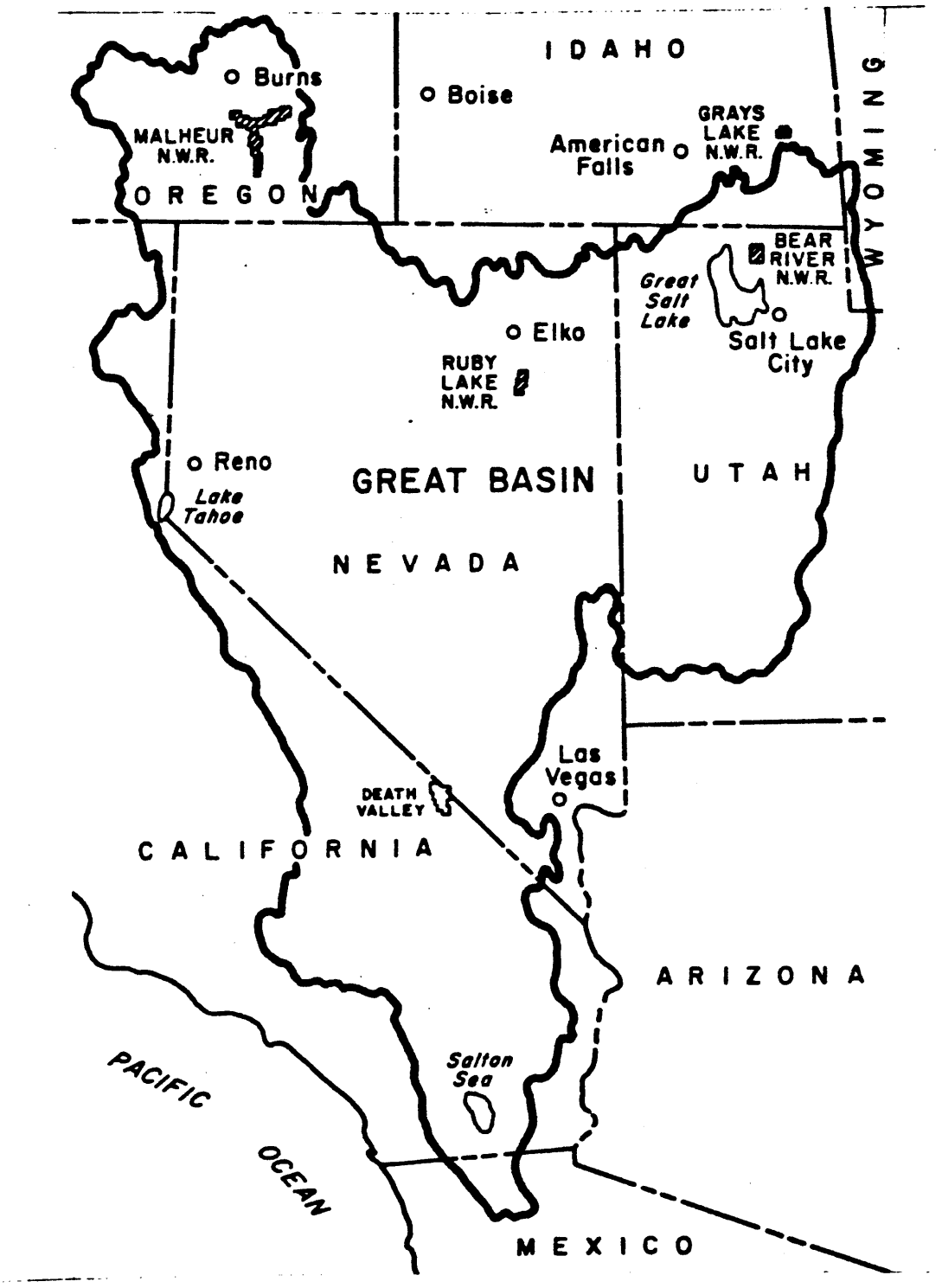


Figure 1. Location of the Malheur NWR in Relation to the Great Basin

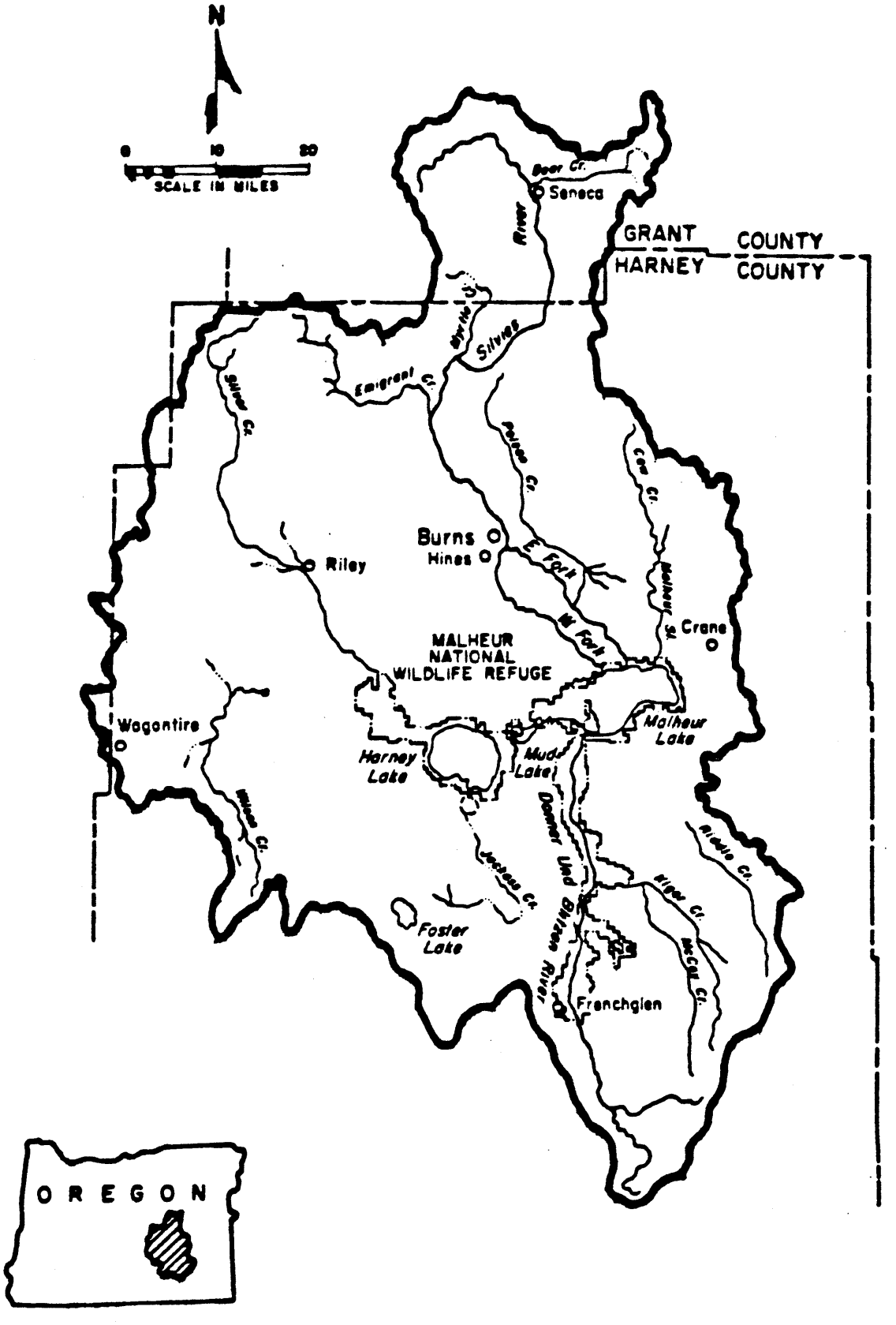


Figure 2. Malheur-Harney Lakes Drainage Basin

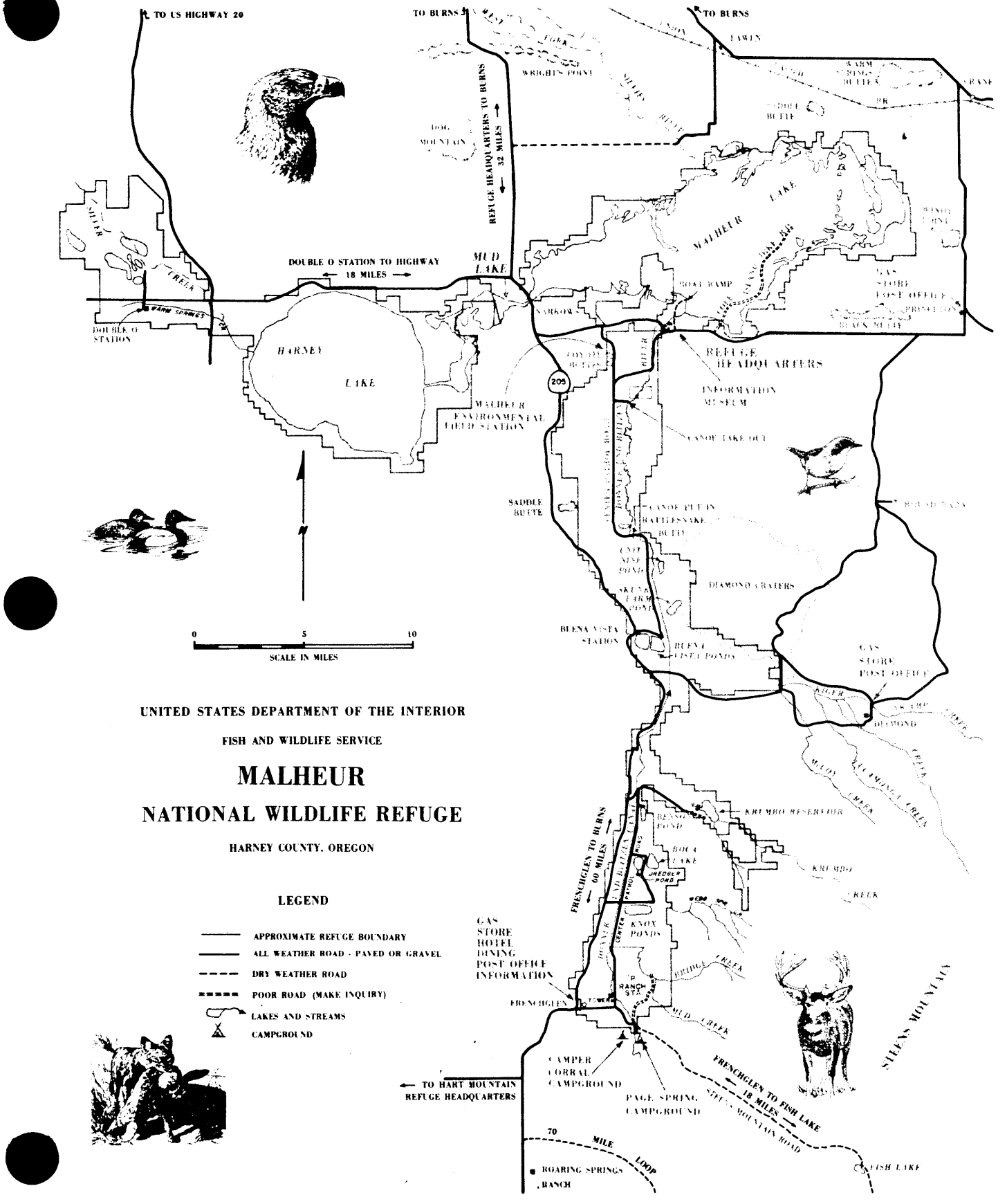
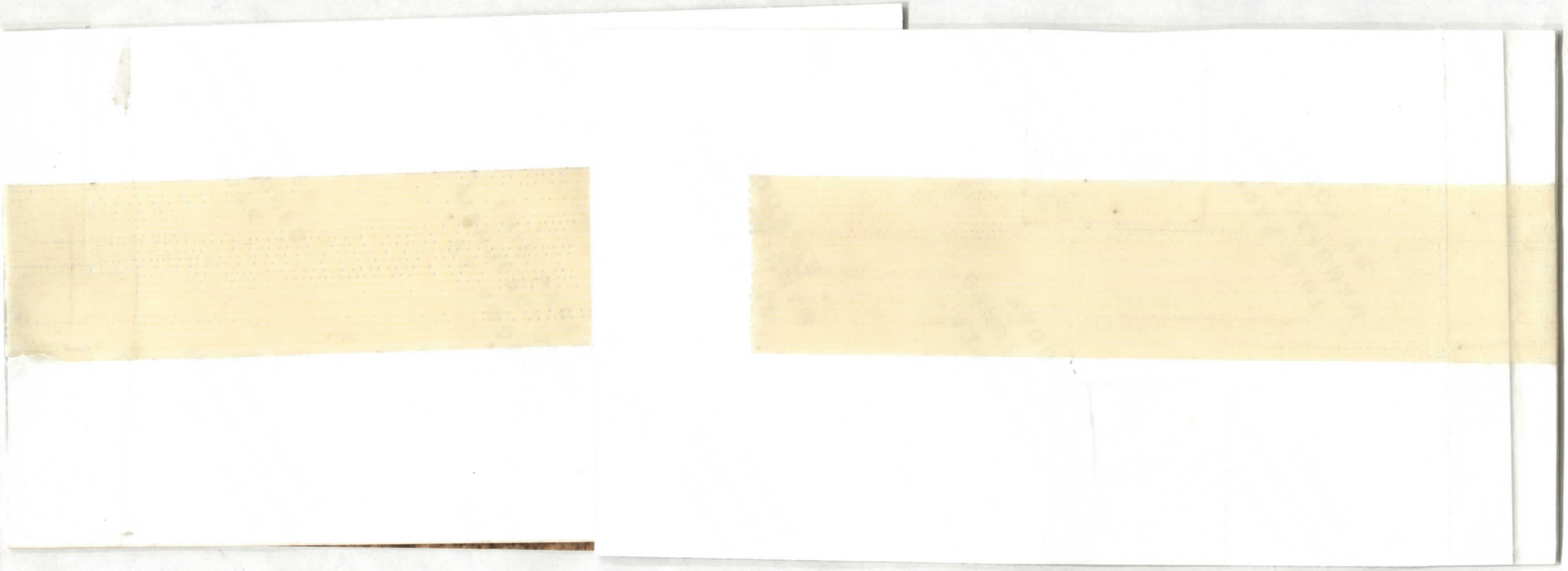

TO US HIGHWAY 20
TO BURNS
TO BURNS
REFUGE HEADQUARTERS TO BURNS 32 MILES
DOUBLE O STATION TO HIGHWAY 18 MILES
MUD LAKE
DOUBLE O STATION
HARNEY LAKE
MALHEUR ENVIRONMENTAL FIELD STATION
205
REFUGE HEADQUARTERS
INFORMATION MUSEUM
CANOE LAKE OUT
CANOE PUT IN
SADDLE BUTTE
DIAMOND CRATERS
BUENA VISTA STATION
GAS STORE POST OFFICE
KRUMBO RESERVOIR
FRENCHGLEN TO BURNS 60 MILES
GAS STORE HOTEL DINING POST OFFICE INFORMATION
FRENCHGLEN
CAMPER CORRAL CAMPGROUND
PAGE SPRING CAMPGROUND
TO HART MOUNTAIN REFUGE HEADQUARTERS
FRENCHGLEN TO FISH LAKE 18 MILES
STEENS MOUNTAIN
70 MILE LOOP
ROARING SPRINGS RANCH
FISH LAKE
0 5 10
SCALE IN MILES
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
MALHEUR
NATIONAL WILDLIFE REFUGE
HARNEY COUNTY, OREGON
LEGEND
APPROXIMATE REFUGE BOUNDARY
ALL WEATHER ROAD - PAVED OR GRAVEL
DRY WEATHER ROAD
POOR ROAD (MAKE INQUIRY)
LAKES AND STREAMS
CAMPGROUND

Figure 3.



Refuge Headquarters as it appeared from the tower hill. All Headquarters buildings are still intact.

November DFK

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A. HIGHLIGHTS

Record precipitation and runoff from snow melt raised Malheur and Harney lakes to never before recorded high water levels which affected almost all refuge activities and waterbird populations. (Sections B, F.2, G and H).

The Dunn Land Exchange was one step closer to finalization when an Agreement for Exchange of Lands was signed. (Section C.3).

Research indicates that predation by coyotes is one of the contributing factors in the low recruitment rate of greater sandhill cranes. (Section D.5).

Bill Aulbach, Maintenance Mechanic at the P-Ranch, died of a heart attack in June. (Section E.1).

Grazing use reached a historic low of 28,216 AUM's during the 1982-83 grazing season. (Section F.7).

The "one-time" emergency forage program was in effect for the second year with 17,875 AUM's of forage allocated to ranchers that were flooded by Malheur and Harney lakes. (Section F.7).

Lightning and arson caused wildfires burned 2,150 acres of refuge uplands. (Section F.9).

The Squaw Pit Archeological Site was approved for inclusion on the National Register of Historic Places on November 2. (Section F.12).

Four new bird species were observed this year, increasing the refuge bird list to 294 species. A red fox observation increased the mammal list to 58 species. (Section G.1).

Greater sandhill crane recruitment rate was 9.1 percent or 2.5 percentage points greater than the 1975-83 average of 6.6 percent. (Section G.4).

Five more river otters were released on the refuge. (Section G.12).

Visitation dropped from an estimated 36,395 visitors last year to 19,880 this year because of flooded and closed roads both on and off the refuge. (Section H.1).

Two local men were cited under the Archeological Resources Protection Act of 1979 (ARPM) for digging in an archeological site. (Section H.17).

Krumbo Reservoir Dam was rehabilitated after sustaining severe erosion damage in 1979 when an upstream dam broke and over-topped the dam. (Section I.2).

Flooding by the Blitzen River caused extensive damage to facilities and disrupted nesting birds. (Sections I.3 and G.).

A briefing and over-flight of the refuge were given to Director Jantzen. (Section J.2).

Monetary Special Achievement Awards were presented to four staff members. (Section J.2).

B. CLIMATIC CONDITIONS

Record levels of precipitation, mountain snow packs and water in both Harney and Malheur lakes characterized this year's weather. January began with below zero (^{o}F) temperatures, but warmed up to 50^{o}F on January 6, melting the snow. February was mild with normal precipitation. These mild temperatures cleared the ice from Harney Lake on February 15 and from Malheur Lake on February 18. During March 3.84 inches of precipitation fell at refuge headquarters. This broke the previous all-time monthly record of 2.07 inches set in 1978. All rivers were flooding by mid-March, initiating the unprecedented rise in lake levels (Figure 4).

April brought continuing mild temperatures and heavy runoff. Malheur Lake had risen over 2 feet by April 29, covering over 80,000 acres! During May another 2.05 inches of moisture fell at headquarters. Water began flowing over State Highway 205 at the Narrows on May 12. An exceptional heat wave during the last week of May initiated the worst flood of the season on the Blitzen River. Severe damage occurred to dikes, roads and ponds as a record 93^{o}F was recorded at headquarters on May 28. Coupled with this heavy runoff came a drenching rain of 1.14 inches on May 31. The last frost was May 17, making this an exceptionally early vegetative growth year. Heavy runoff kept the Blitzen River high through June and early July. Malheur peaked at 4098.80 feet MSL (95,200 acres). This was an increase in water elevation of 3.64 feet in 1983. This made Malheur Lake the largest lake in the State of Oregon. Harney Lake rose 4.80 feet from mid-March to a peak of 4098.39 feet MSL.

Unprecedented high water in Malheur Lake flooded several ranches, including Ralph Opie's. The north edge of the refuge and Malheur Lake are off the photo in the foreground.
May JPM

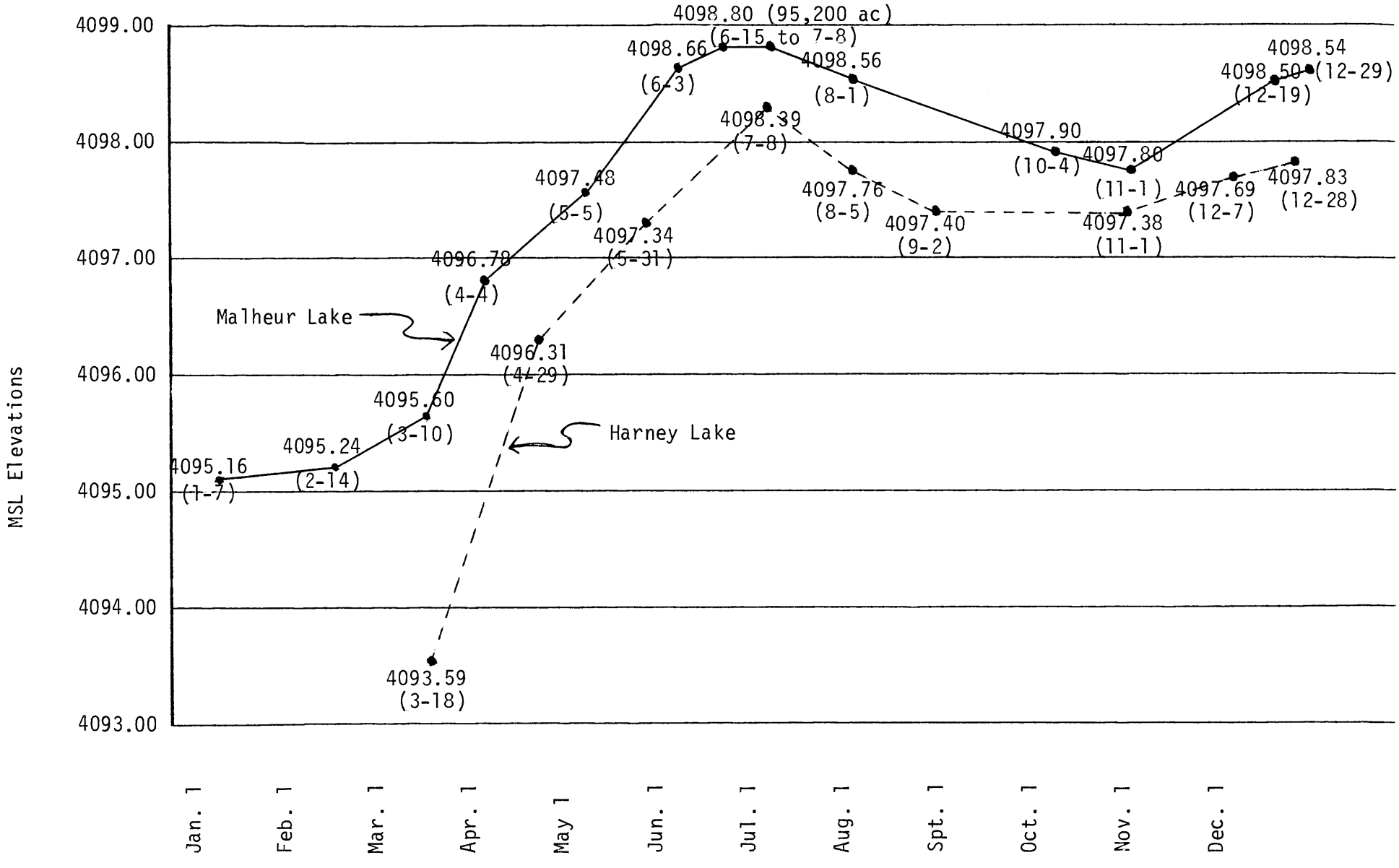

Figure 4. Lake Levels, Malheur NWR, 1983.

The water level of Malheur Lake only dropped 1.0 foot during the evaporation season of July, August and September. Prolonged hot spells and accompanying winds did not occur this year. The first hard freeze took place on October 12 when 25°F was recorded at headquarters. Malheur Lake started to rise after reaching a low of 4098.80 feet MSL (86,900 acres) on November 1. Harney Lake also reached its lowest elevation on November 1 at 4098.38 feet MSL.

Near record precipitation again fell in November. Record snowfall fell at Burns during November. Snow was recorded on 17 days during December at headquarters, totaling 25.5 inches. Malheur Lake froze over on December 7 due to heavy snow and cold temperatures. This was over 3 weeks later than normal due to the lake's depth and size. The year ended with sub-zero temperatures and 9 inches of snow on the ground at headquarters.

Record runoff figures in Harney County for 1983 were as follows:

	1983*	Mean*
Silvies River	428,500	120,300 (62 yr)
Blitzen River	177,000	86,940 (45 yr)
Silver Creek	80,000 est.	30,720 (24 yr)
Total	685,500	237,960

Year	Total Flow* (3 Rivers)	% of Normal
1977	82,350	35
1978	312,660	131
1979	366,050	154
1980	297,960	125
1981	150,280	63
1982	494,900	208
1983	685,500	288
Mean	237,960	100

*Figures in acre feet

A record yearly precipitation of 17.95 inches fell at headquarters. Annual precipitation has surpassed 12 inches in only 5 years since 1937. Three of those years were 1979, 1981 and 1983. We are currently in a unique wet cycle which will not end this year due to existing snow packs in the mountains. By late December the snow water equivalent was 225 to 400 percent of normal, which is 130 to 214 percent above last year's figures. Therefore, unprecedented higher water levels will occur in 1984.

C. LAND ACQUISITION

2. Easements

In 1982 an easement was drafted for a permanent road right-of-way from the county road at Lawen into the central portion of the Malheur Lake public waterfowl hunting area. This project was "moth balled" this year when the proposed right-of-way flooded and became part of Malheur Lake. Much of the dike that the road was to follow has been eroded by wave action.

3. Other

Approval was received conferring ownership to the refuge of 199.9 acres of public domain land on the east side of Malheur Lake. The withdrawal will remain in effect for 40 years. This withdrawal action was initiated with the Bureau of Land Management (BLM) on March 22, 1971 and finalized on September 29, 1983.

Efforts initiated in 1981 to acquire 788.91 acres of marshland in Mud Lake owned by the Oregon State Land Board were still pending at the end of the year. The proposal involves exchange of State lands for Federal lands under the control of GSA at Astoria, Oregon, near the mouth of the Columbia River. These lands are desired by the State as part of its planned development of a deep water port. Waterfowl habitat in the Lower Columbia River desired by the Service is also involved.

The Dunn Land Exchange progressed one step closer to finalization when Larry Dunn signed an Agreement for Exchange of Lands. This exchange, begun in 1982, involves approximately 2,460 acres of inholdings on Mud Lake and 1,042 acres of refuge wet meadow in the Diamond Valley.

Acquisition of this land on Mud Lake would permit restoration of this once outstanding natural marsh, which was historically a heavy producer of sago pondweed. It would also give the Service complete control over the entire Malheur-Mud-Harney lake system.

An archeological survey was completed on the Diamond Valley land. Six prehistoric and two historic sites were discovered. Finalization of this exchange will depend upon further investigation of these sites to determine their National Register listing status.

The exchange of 120 acres of refuge land for 80 acres of land owned by Bell "A" Grazing Cooperative was approved pending a title search, etc. The refuge traded greasewood uplands for marsh adjacent to Malheur Lake.

D. PLANNING

1. Master Plan

The Master Plan was one step closer to completion. An Executive Summary of the plan was printed and distributed for public comment. Four responses were received. After consideration of these comments, the Master Plan will be ready for final approval.

2. Management Plan

A migratory Bird Disease Contingency Plan was written. A Vegetation Management Plan was written to include emergency haying/grazing plans. The Water Management Plan was updated.

Land Protection Plans are being developed by the Regional Acquisition Office for tracts of land that the refuge is willing to acquire or dispose of.

4. Compliance with Environmental Mandates

An Environmental Assessment of the Dunn Land exchange was completed. The Division of Realty contracted Carroll D. Littlefield to write this assessment.

5. Research and Investigations

Malheur NR83 - "Effects of Prescribed Burning on Major Plant Communities of the Malheur National Wildlife Refuge"-MLH-19.

This research project was conducted by Rick Young, a PhD. candidate at Oregon State University. The project was supported by Squaw Butte Experiment Station and the refuge.

The objectives and justification for the study were previously described in our 1982 Narrative Report. The final report should provide recommendations on fire prescriptions for upland and marsh vegetation, fire management and fire observations. His thesis is scheduled to be completed and available in early 1984.

Malheur NR83 - "Influence on Vegetation Structure and Composition, and Water Distribution on Nest Site Selection of Ground Nesting Birds in the Double O Area."-MLH-20.

Principle investigators in this study were Craig Foster, a Master's Degree candidate from Humboldt State University, and David Paullin, Refuge Biologist. Field work for this study was completed in 1981 and final reports are expected to be available in 1984.

Malheur NR83 - "Color Marking Juvenile Trumpeter Swans on Malheur NWR, Oregon."-MLH-21.

Gary Ivey, Assistant Wildlife Biologist, has been the principal investigator in this study. Objectives and justification for the study were previously listed in our 1982 Narrative Report.

Results to Date

Of the 10 cygnets collared in 1980, only 10AA was sighted in 1983. Of the nine cygnets and one adult collared in 1981, none were observed in 1983. Cygnet 11AA was found dead under a powerline in 1982 and cygnet 14AA was found dead and partially eaten by a predator on October 19. Of the 14 cygnets and one adult collared in 1982, 22AA was found being consumed by a bobcat in January 1983 and eight were observed in 1983. Of the 12 cygnets collared in 1983, nine have been reported after marking.

Table 1 lists the number of collared swans observed from each year's banding effort during subsequent years. Approximately 21 percent of collared birds were never observed after initial marking; approximately 51 percent have not been observed again after the first year and approximately 90 percent have not been observed again after the second year. Possible reasons for the lack of observations of these birds include: 1) Collars may have broken off. One bird, marked in 1980, had lost its neck collar and was identified by its leg band. Birds marked in 1980 and 1981 had their collars attached with "super glue" while birds marked in 1982 and 1983 had their collars attached with aluminum pop-rivets; 2) Birds may have died. Three known collared birds have died, one a possible powerline collision victim and the others were possible predation victims; and 3) Birds may not be using the refuge. Of the possible factors, loss of collars and mortality are the most likely reasons for their disappearance.

Table 1. Number of collared swans observed following initial collaring, Malheur NWR, 1980 - 1983.

Year Collared	# Collared	# Observed* 1980	# Observed 1981	# Observed 1982	# Observed 1983
1980	10	9	6	2	1
1981	10**	-	5**	3**	0
1982	15**	-	-	14**	8
1983	12	-	-	-	9

*After initial collaring
**Includes 1 adult

It appears that some mortality occurs to cygnets just before fledging. This is possibly due to drying of their habitats and increased exposure to predation due to brood wandering. As previously stated, 21 percent of collared swans were never reported after marking. It is assumed that the majority of these birds succumbed to predation. before fledging. Some of this mortality may have been influenced by the marking and banding program, although many unmarked cygnets also disappear just prior to fledging.

Other event trends are that wintering swans tend to spend time in the Blitzen Valley and at the Double-O until freeze-up causes them to move to open waters such as the Sod House Spring. Young birds generally have been observed in the spring until the nesting season begins, but apparently they leave the area while adults nest, not returning until after territorial aggression ceases. Presently, it is not known where the subadults spend the summer. The data provides evidence that trumpeter swans have strong family bonds and behave as a family group for at least 2 years after hatching (An adult male, 17AA, was observed on October 28, 1982 with his broods from the previous two seasons.).

Only one marked swan has been reported off the refuge, but positive identification was not determined. Preliminary data indicates the local nesting population of trumpeter swans is sedentary.

Malheur NR83 - "Experimental Control of Predation on Eggs of Greater Sandhill Cranes on Malheur NWR, Oregon."-MLH-26.

The principle investigator in this study was Carroll D. Littlefield, with support from the refuge. Field work was initiated in 1982 and completed in 1983. The results of this study will be available in 1983 and will be summarized in next year's Narrative Report.

Malheur NR83 - "Radio-telemetry Studies of Juvenile Greater Sandhill Cranes on Malheur National Wildlife Refuge, Oregon."-MLH-27.

This is a cooperative study with funding provided by the Oregon Department of Fish and Wildlife and the Service. The principle investigator is Carroll D. Littlefield. The study was initiated in 1983 and will be continued in 1984.

This juvenile greater sandhill crane was radio tagged to determine chick movements and causes of mortality. Radio transmitter is attached to the tarsas and weighs 65 gm.

BDE

The primary objective of the study is to document movements and mortality of pre-fledged sandhill crane chicks on Malheur NWR.

1983 Results

Twenty-one greater sandhill crane chicks were radio-equipped during the study (Table 2). Unfortunately, radios were not received until May 21, approximately 1 week after the hatching peak. Contact was lost with four chicks, 13 chicks were known lost to predators, one died of parasitic pneumonia, one drowned, and two fledged. Two of the chicks in which radio contact was lost (Chicks 153 and 173), were known to have died before fledging. Therefore, total mortality of monitored chicks was 89.5 percent. Mammalian predators accounted for 52.5 percent of the chicks, while great horned owls were suspected of taking at least two (10.5%).

Thirteen chicks were radio-equipped within 4 days after hatching. Two chicks were radio-tagged within 1 week of fledging (55 to 60 days), while six chicks were tagged when 14 to 30 days old. The average survival period for the 12 chicks radio-equipped shortly after hatching was 19.3 days (range 1 to 54 days). Five chicks captured when 14 to 56 days old survived an average of 15.8 days (range 5 to 30 days). One chick radio-equipped on June 23 fledged on July 23. The other surviving chick was radio-equipped on August 8 and fledged around August 12.

Table 2. Suspected fates of 21 Greater Sandhill Crane chicks radio-equipped, Malheur NWR, 1983.

Chick No.	Radio Channel	Date Equipped	Date Lost	Suspected Fate
13	7a	24 May	26 May	Coyote
23	12	24 May	26 May	Coyote
33	16	24 May	10 June	Raccoon
43	9	26 May	17 June	Disease
53	2	27 May	28 May	Drown
63	14	31 May	9 July	Lost Contact
73	19	31 May	27 June	Great Horned Owl
83	10	31 May	27 June	Great Horned Owl
93	11a	1 June	3 June	Coyote
103	15	1 June	3 June	Coyote
113	00	1 June	3 June	Coyote
123	17	1 June	12 June	Coyote
133	8	2 June	16 June	Lost Contact
143	4	3 June	13 July	Coyote
153	1a	7 June	27 June	Lost Contact
163	11b	15 June	20 July	Coyote
173	5	23 June	23 June	Lost Contact
183	13	23 June	28 Sept	Fledged
193	7b	29 June	12 July	Coyote
203	3	5 Aug	10 Aug	Canine
213	1b	9 Aug	11 Oct	Fledged

Malheur NR83 - "Canada Thistle Mowing Study"-MLH-29.

This study was initiated in 1982. David Paullin, Refuge Wildlife Biologist, is the principal investigator.

Objectives:

1. Establish a monitoring program to determine the rate of Canada thistle invasion into refuge meadows.

2. Determine whether earlier mowing dates tied to the growth cycle are effective in the control of Canada thistle invasion into meadows.

Justification:

Canada thistle is considered a noxious weed and has little value to wildlife. Its encroachment into native meadows leaves meadows less attractive to permittees for haying or grazing and may negatively impact wildlife. It has been suggested that invasion of this plant into meadows can be controlled by haying earlier (before the thistle goes to seed).

Field work is continuing in this on-going study. When significant results are achieved, the information will be made available.

Malheur NR83 - "Color-marking of Greater Sandhill Cranes on Malheur National Wildlife Refuge, Oregon"-MLH-30.

Carroll D. Littlefield is the principle investigator in this study (on a volunteer basis) with support from the refuge.

Objectives:

1. Individually mark greater sandhill cranes that nest on Malheur NWR, to ascertain nesting and fledging success in relation to land-use practices.

2. Color-mark greater sandhill cranes that stage on Malheur NWR in the fall to determine which birds within the population's nesting range are using the refuge before migration.

Justification:

Various land use practices have been used on Malheur since 1973. Nesting success has been consistently higher in areas that have been deferred from grazing. Also, higher nesting success has been recorded in areas that have been mowed, but with no subsequent grazing. However, no information is available on differences in fledging success under these different land use regimes. To ascertain if there are differences in fledging success, nesting pairs need to be individually marked so nesting territories can be located.

Beginning in mid-September and continuing through October, the staging population rapidly increases, often building to 3000 cranes before migrating south to wintering areas in California. To determine if these birds represent members of the entire Central Valley Populations

of greater sandhill cranes an effort will be made to mark as many cranes as possible during this period. Color-marking should allow observers in other areas of the population's range to see and record these marked birds.

In 1982 22 cranes, including three juveniles, were marked on the refuge. An additional 43 cranes, including four juveniles, were marked in 1983. This study will continue and when significant results are acquired, they will be submitted for publication.

Malheur NR83 - "White Pelican Foraging Habitat Utilization in Southeastern Oregon"-MLH-31.

This was a cooperative study involving the Nature Conservancy, the Oregon Department of Fish and Wildlife and the Service. Geoff Pampush of The Nature Conservancy was the study coordinator. His field investigator was Mark Smith.

Objectives:

1. To determine habitat utilization patterns of white pelicans in southeastern Oregon and northern California.

2. To determine the fish faunal composition of habitats used by white pelicans in southeastern Oregon and northern California.

Scope:

The inventory will be conducted in the following basins. Malheur/Harney, Summer Lake, Warner, Goose Lake and Klamath.

Justification:

The purpose of the inventory is to establish the habitats and characteristics of the habitats that pelicans use. The information will be used in future considerations of water management in the northern Great Basin, fish management objectives and overall white pelican management.

We expect to receive a copy of the results of this study in 1984. It will be summarized in our 1984 Narrative Report.

E. ADMINISTRATION

1. Personnel

Project Leader Joe Mazzoni received a promotion when he transferred to Alaska on August 8, after having guided Malheur for 12 years. Joe is presently in charge of Support Services in Anchorage. Joe will be missed. His achievements in bringing the refuge through a period of tremendous change and controversy will not soon be forgotten. Good show!

Dean Knauer and his family transferred from DeSoto NWR to accept the principal assistant's position on May 15. After a short orientation period, Dean was given the job of Acting Project Leader from July 1 to the year's end.

Assistant Biologist Steve Thompson transferred to Nisqually NWR on February 5. Steve spent five and one-half productive years at Malheur and left some big shoes to fill.

Gary Ivey reported on August 21 to fill the Assistant Biologist position. Gary and his family transferred from Kern NWR and has proven himself a very capable member of our team.

Dee Ehlers joined our staff February 28, to assist with the typing and filing. Dee has done an excellent job.

Randy Aulbach and Glen and Larry Grindstaff worked during the year as intermittent and temporary Maintenance Mechanic Helpers. Randy was hired to work at the P-Ranch after his father, Bill, suffered a heart attack. Glen was hired during the busy fall field season to assist with road, dike and ditch maintenance. Larry was hired to do energy conservation projects and grounds maintenance.

Carroll D. Littlefield and Susan Lindstedt were hired as temporary employees to conduct research on the refuge (See MLH-26 and MLH-27.).

Biological Aide Jon Anderson spent the summer collecting biological information.

Ellen Kelley volunteered her services during the summer (See E-4.).

YCC Work Leaders were Shauna Tackman and Tom Johnson. They were hired through the Student Conservation Association.

We also lost a good man forever. Maintenance Mechanic Bill Aulbach died at his home at P-Ranch of a heart attack on June 21. He and his family will be missed. Bill will always be remembered for his hearty work habits and his ability to truthfully speak up on any issue that he felt strongly about.

Bill Aulbach died of a heart attack in June. Bill and his family will be hard to replace.

DFK

Our on-board strength for the past 5 years is displayed in Table 3. Although Temporaries were up 100 percent over last year, our total FTE's did not exceed 13.5. This increase in Temporaries was due to additional researchers and personnel needed to do work normally accomplished by a full on-board strength of three Maintenance Mechanics.

Table 3. On-board Strength - Malheur NWR.

	Permanent		Temporary
	Full-time	Part-time	
FY79	12	0	7
FY80	12	0	4
FY81	12	0	3
FY82	12	0	4
FY83	12	0	8

2. Youth Programs

The refuge hosted a Youth Conservation Corps (YCC) Camp, consisting of two group leaders and 12 enrollees. The camp started on June 13 and lasted for 8 weeks. The following major projects were completed: headquarter's buildings painting, goose banding, campground maintenance for BLM and refuge fencing. Two public service projects were also completed. Enrollees assisted the local Sodhouse School District by moving the contents of the school house to the Malheur Field Station before it was flooded. Wooden school desks were also stripped and refinished. Stylish wooden barriers were built and put around young trees growing along the streets of Burns. Many positive comments were received from both communities.

Group Leaders, Shauna Tackman and Tom Anderson, were recruited and hired through the Student Conservation Association. They are teachers in Burns-Hines and both did a remarkable job. The two 6-person crews were placed on four 10-hour days when State Highway 205 became flooded at the Narrows. This road closure created a 52 mile daily drive each way for our non-resident crews. To save additional travel time, crews also camped overnight on several projects. The enrollees put in 3,524 hours of work valued at $48,600 for an average manhour value of $13.79.

4. Volunteer Program

Three people provided volunteer work at Malheur Refuge. Ellen Kelley spent six months during the spring and summer carrying out both biological and public use activities. On weekends and holidays, Ellen was our visitor contact person, answering questions and providing information to visitors. During the week days she functioned as a biological aide, assisting in routine census work, data gathering, banding, etc.

Susan Lindstedt was hired in the summer to conduct radio-monitoring of sandhill crane chicks (See D.5 Research and Investigations). When Susan's temporary appointment was terminated, she continued radio-tracking newly fledged crane chicks on the refuge as a volunteer. In the fall, she followed the radioed birds to their wintering grounds in California.

C. D. Littlefield was a volunteer during the fall and winter months in between field seasons. Much of this time was spent writing reports and publications on his sandhill crane research, which now spans 17 years on the refuge.

5. Funding

The following is a summary of funding and permanent positions for the last 5 years. Note that this year's budget is finally approaching the FY79 funding level. Lots of sacrifices in the interim.

Operations Budgets, Malheur NWR, FY79-83
(Includes Cyclic Maintenance)

Funds Source	Fiscal Year (funds in dollars)				
	1979	1980	1981	1982	1983
1210	431,700	334,700	373,200	415,000	448,000
1240	62,150	49,200	49,000	50,000	51,000
6810	64,400	64,000	43,000	25,000	21,000
1220	--	--	--	--	19,100
1230	--	--	--	--	500
1994	--	--	--	--	14,200
Total	558,250	447,900	465,200	490,000	553,800
Rehab	430,100	--	--	--	--

6. Safety

Dave Paullin served as station safety officer. Safety meetings were scheduled on a quarterly basis. Al Foulke, BLM radio technician, gave a presentation on the use and safety of our two-way radio system. Responsibility for conducting the meetings was rotated among all employees.

Joe Mazzoni, Brad Ehlers, Norm and Ruth Warneke, Clyde and Arlene Miller, Marv Jess and Charlie Yriarte began a 100 hour Emergency Medical Technician (EMT) course, taught by EMT Instructor, Mark Rines, of Burns. Course purpose was to teach the staff how to respond to an emergency in the remote areas of the refuge. The course was modified near the end to qualify attendees for First Responders Certificates because the EMT course required experience in ambulances and emergency rooms, which was impractical for our situation. All participants felt the course was extremely helpful, especially since EMT's and doctors are at least one hour away from all refuge housing.

Two accidents happened during the year. Larry Grindstaff, Maintenance Mechanic Helper, got a piece of sawdust in his eye on April 6, which subsequently scratched the surface of his eye. Larry missed one day of work due to the accident. Ellen Kelley, volunteer, had an auto accident in Bend, Oregon while in travel status. Her vehicle hit the rear end of a Volkswagon at a stoplight. A Tort Claim for $1,977.20 was paid for injuries and property damage sustained by the individuals of the other vehicle. This incident took place on June 27.

Major safety commitments scheduled for 1984 include updating the fire extinguisher system, roll-over protection and preparation of a Station Safety Plan.

7. Technical Assistance

The refuge provided technical assistance and facilities to aid the Oregon Department of Fish and Wildlife with raptor rehabilitation. Assistance with bald eagle surveys and management was also provided to the U.S. Forest Service and the BLM.

This rough-legged hawk was rehabilitated in cooperation with the Oregon Department of Fish and Wildlife.

BDE

C. D. Littlefield provided major amounts of technical assistance on greater sandhill cranes to The Nature Conservancy, Nevada Game and Fish, California Fish and Game, Washington Game and Fish, the University of Alaska, the International Crane Foundation, Kern NWR, and the Oregon High Desert Museum in Bend, Oregon.

F. HABITAT MANAGEMENT

2. Wetlands

The refuge water management plan directs that the irrigation of ponds and sloughs begin by March 1 to provide habitat for spring migrants and breeding pairs of waterfowl and other marsh birds. In general, wet meadows and grasslands adjacent to ponds and sloughs are sub-irrigated or occasionally shallow-flooded. Water is held in ponds and sloughs as long as possible during the nesting season to provide feeding and brood habitat. Water levels are drawn down in late July and early August to facilitate the haying of meadows, which begins August 10, or 2 weeks earlier in some cases.

Water management was complicated by record high lake levels, frequent floods and record snow packs throughout the entire watershed. At the first of the year, Malheur Lake had the highest lake level carry-over ever recorded, 65,300 surface acres.

Breeched dikes flooded native wet meadows, reducing the amount of grass produced.

DFK

The yearly runoff recorded was 685,500 acre feet of water, from three primary drainages, which was 288 percent of normal. This was the second "one-hundred-year flood" in as many years. Malheur Lake swelled to 95,200 surface acres by mid-June, with approximately a third of the lake inundating private lands outside the refuge boundary.

Record high water levels are having a dramatic effect on the vegetation of Malheur Lake marsh. In the mid and late 1970's there was growing concern among refuge personnel that the marsh was becoming choked with emergent vegetation. This was primarily hardstem in the center portions and burreed in the shallower edges. Emergents were so thick that airboat travel to the lake's center was limited to

one narrow trail. Much of the lake was totally inaccessible even to airboats. With lake levels now in excess of 9 feet in the center of the lake (Unit 5), the emergent encroachment has been reversed.

On May 26, 100 percent of Unit 5 was open water. The effects of deep water combined with ice and wind action have removed and/or dramatically opened up thousands of acres of dense hardstem bulrush. By summer's end, only very sparse stands of bulrush managed to grow in Unit 5. In Unit 6, the eastern third of Malheur Lake, massive failure of hardstem bulrush and Baltic rush to grow was evident east of Cole Island Dike and along Juncus Ridge. In addition, no alkali bulrush was recorded in Unit 6 because of the high water. Cole Island Dike, which separates Units 5 and 6, was under water from early June to the present. On May 26, Unit 6 was 90 percent open water.

Unit 4, the western portion of Malheur Lake, similarly lost most of its emergent vegetation along with many of the upland peninsulas, which in normal years form a pothole-like mosaic. On May 26, Unit 5 was 95 percent open water.

Record high water in Malheur Lake, combined with continued high carp populations, has nearly decimated sago pondweed production. Table 4 summarizes the decline in sago since the last carp control efforts in 1977.

Table 4. Summary of Recent Aquatic Vegetation Surveys on Malheur Lake.

Year	Sago Acreage	Sago Volume (ml)	Alkali Bulrush Acreage
1977	0	0	0
1978	22,220	18,658	2,110
1979	17,420	10,750	2,000
1980	900	1,090	2,650
1981	400	1,670	2,340
1982	3,500	785	2,000
1983	Trace	Trace	0

Unit 3, Mud Lake, covered 8,200 acres on May 26, including most of the 2,600 acre Larry Dunn ranch. At this elevation, the lake was mostly open water and flooded greasewood.

Unit 2, Harney Lake, now covers approximately 35,000 acres up from 30,000 acres in 1982. The biggest change, however, was the lake depth. In June 1982, Harney Lake averaged 9-10 feet deep and in June 1983, the lake averaged 18 feet deep. Compared to the summer of 1978, Harney Lake was a dry alkali playa!

Unit 1, the Double-O area, had another extremely wet year with runoff from Silver Creek exceeding 200 percent of normal. Excess water poured over the spillway of Moon Reservoir north of the refuge for most of the spring. Most of the area north of the substation was inundated, creating less than optimum duck nesting habitat. Fields almost entirely inundated were: Petersen, Plow, Double-O Grain, Stinking Lake, Red House and Freeman. In addition, record high water levels in Unit 2 forced Harney Lake to back into Unit 1, inundating 2,000 acres of Lower Swamp Field and adjacent private ranches.

In the Blitzen Valley (Units 7-12), frequent flooding combined with several flood damaged dikes, caused inumerable water management problems. In late May and early June, the flooding Blitzen River topped the Center Patrol Road in several places and began breeching many dikes in the Blitzen Valley. Areas most severely flooded were: Unit 7 at Wrights Pond; the east side of Unit 8 along the Center Patrol Road; the entire Diamond Valley (Unit 9); all fields in Unit 10 adjacent to the river from Witzel Lane to Diamond Lane, including one-third of the East Grain Camp Field and most of Unit 11, particularly Bailey, North White and West Swamp #2 fields; and the Island Field in Unit 12.

Despite all of the record flooding, there were areas of the refuge that were too dry for optimum duck nesting. Wetland areas considered too dry were: Center Sagebrush, Rockford Lane and Wright Field in Unit 7; the center and south ends of Unit 8; Skunk Farm and Oliver Springs fields in Unit 9; Krumbo Valley in Unit 10; and the south and east portions of Unit 12. A severely damaged water delivery system, including washed-out roads, prevented adequate irrigation in many of these areas.

As we enter 1984 we have witnessed the second "one-hundred-year-flood" in 2 years. Malheur Lake now covers approximately 93,000 surface acres, an all-time record. At year's end, the snow pack in the three primary drainages was nearly 200 percent of normal. All indications at this time point to runoff and flooding in 1984 to be a record breaking "one-hundred-year event".

4. Croplands

The primary objective of farming on Malheur is to provide food for greater sandhill cranes during the fall migration. This crane population is declining because of low recruitment and a high rate of mortality on their wintering grounds in the Central Valley of California. The grain fields have helped hold these birds here longer, thus reducing one factor in their mortality rate. The grain fields are also utilized by Canada geese, mallards and upland game during the fall.

Both cooperative and force account farming are used. Only one field, East Grain Camp, was farmed by Cooperator Harlan Crawford this year. Three other fields scheduled for planting were unexpectedly flooded in June. Only 291 acres of barley were grown. The remaining 60 acres were planted, but flood water prevented germination. A good yield of 30 bushels/per acre was harvested.

The crop sharing ratio is normally 80:20. However, this year the cooperator received most of the crop that the cranes had not depredated before harvest.

Two small grain fields near Sodhouse Dam were force account farmed last in 1982. One field, drilled with winter wheat in the fall, produced abundant grain by this fall. The other field which had been planted to winter wheat in 1981 was disced in 1982 and the grain allowed to volunteer. This field produced very little grain. These fields are used primarily by upland game and wintering Canada geese.

5. Grasslands

The small amount of true grassland on the margins of the refuge are managed contigious with the wetlands discussed in Section F.2.

The following crested wheatgrass seedings were grazed: Dredger #1, Krumbo and Mud Creek fields. The first two fields were used by emergency forage permittees.

7. Grazing

Ample rainfall and irrigation water contributed to producing excellent forage conditions in most fields. However, several fields, West Swamp and Bailey fields, were flooded too deep and too long with a resultant reduction in forage quality.

Summer and fall rains kept the BLM desert grasses and crested wheatgrasses green and nutritious through November. This permitted BLM to extend their summer grazing permits, which meant that additional forage was available for ranchers affected by high lake levels.

Livestock use by regular refuge permittees totaled 24,988 AUM's for the 1982/83 grazing season. This use, combined with emergency forage use (discussed below), was the lowest recorded use in history. This year's total, 28,216 AUM's, was 3,319 AUM's less than in 1982.

An additional 3,228 AUM's of grazing were allocated in 1982-83 to flooded ranchers that had lost their deeded grasslands to high water. In 1982 the Harney County Emergency Board was organized to seek relief for flooded ranchers. The Board asked the refuge and the BLM if they had any additional forage that could be released. This was the first year that the refuge participated in this "one-time" emergency forage program. For these emergency forage permits, the AUM rate was lowered from $3.70 to $1.40, the rate charged by BLM. The charge for hay was reduced from $9.25/ton to no charge. The program worked well, with one exception. One rancher sold his free hay for a profit to non-flooded ranchers, thus making himself very unpopular.

The emergency forage program was expanded in 1983 because of the rising water levels. In early 1983, 17,875 AUM's of emergency forage were allocated for the 1983-84 haying/grazing season. It appears that this "one-time" emergency program will be around as long as the water stays high. However, there is no guarantee that the refuge allotment will remain as high as it was this first year.

The major objectives of grazing have not changed from previous years. A 3-4 year deferred grazing program remained in effect. This has provided adequate grass cover for nesting waterfowl and greater sandhill cranes.

8. Haying

A total of 2,952 tons of native wet meadow hay was cut and hauled off the refuge this summer. Of this total, 1,589 tons were removed by emergency forage permittees. As agreed to last year, several permittees were allowed to hay as early as July 25 in an attempt to control thistles. However, for reasons unknown, these fields were not cut at the agreed dates. Many of those fields that could have been hayed or rake-bunch hayed as of August 10 were not cut until 2-3 weeks later. Even when permittees were given the chance to cut hay early, which has been advocated by the ranching community, they still did not take advantage of the haying dates.

9. Fire Management

The Bureau of Land Management is responsible for refuge fire protection via a Memorandum of Understanding. Refuge personnel, equipped with trailer mounted Bean sprayers, carried out the initial attack on all refuge wildfires. The BLM fire crews generally carry out the majority of suppression and mop-up activities on the refuge. BLM maintains several fire crews with large, all-terrain truck tankers in Burns and Frenchglen.

The Antelope wildfire consumed 6,200 acres of BLM and refuge land in mid-August.

DGP

Table 5 summarizes wildfires for the year. Refuge crews provide initial attack on BLM property if the fire is close to the refuge boundary and if BLM equipment is not in the vicinity. The Voltage Fire was close to headquarters and a quick response by our crew prevented a lightning strike from consuming thousands of acres of BLM and refuge sagebrush. This fire could have also threatened the headquarters because the winds were variable. Refuge personnel expended approximately 40 staff days fighting wildfires this year.

Table 5. Wildfires Responded to by Refuge Crews, 1983

Date	Fire Name	Land Ownership	Location	Refuge Acres Burned
July 22	Eagle's Nest	FWS-BLM-Private	5 mi N BV	1,570
July 24	Saddle Butte	FWS-BLM-Private	4 mi N BV	200
July 30	Harney	BLM-Private	N of Harney L	0
July 30	Krumbo	FWS-BLM	Krumbo Creek	80
Aug 14	Antelope	BLM	5 mi N BV	300
Aug 14	Narrows	BLM	6 mi SW HQ	0
Sept 13	Voltage	BLM	1.5 mi SE HQ	0
			Total	2,150

Lightning caused the Eagle's Nest, Harney, Krumbo and Voltage fires. Arson was suspected as the cause of the rest of the burns. It is well known in the local community that BLM will seed crested wheatgrass after a wildfire. Crested wheat will provide much more forage, but much less wildlife habitat. Therein lies one motive for wildfires that start along roads.

The Eagle's Nest fire destroyed about 500 acres of native grass and brush and 6 miles of refuge boundary fence. The extremely hot fire burned root crowns of native grasses. This left loose soil that was highly erosive.

A rehabilitation plan was prepared, submitted and approved for $45,000. The money was allocated for an archeological survey, native grass seed, temporary electric and boundary fencing contracts and an aerial seeding contract. All contracts were awarded by mid-December. The native grass seed and fencing materials were delivered by the end of the year. In addition, a temporary electric fence was erected to keep cattle off the burned area, and an archeological survey was completed.

The archeological survey identified numerous potentially important prehistoric sites. Therefore, it was determined that the native grasses would be aerially seeded to prevent disturbance to the site. Although drill seeding was preferable, this will be an excellent test of the effectiveness of aerial seeding of Great Basin wildrye and native bluegrass.

A prescribed burn of the Dredger Field and pond basin provided early spring wildlife feeding areas.

BDE

Table 6 describes the areas which were prescribe-burned. Burning is accomplished in the winter when fire is more easily controlled. Rick Young's PhD dissertation documented similar vegetation responses to spring, fall and winter burns on the refuge in several habitat types (MLH-19).

Table 6. Prescribed Burns, Malheur NWR, 1983.

Date	Location	Acres	Cost/Acre	Type
January 11	White Field and Benson Pond	500	$0.40	Marsh-Meadow
January 12	Bailey, Witzel, W Hamilton, W Butte and W Grain Camp fields	400	0.52	Meadow
February 17	Larson and Suicide fields and East BV Pond	800	0.51	Meadow
February 17	Skunk Farm Pond	750	0.23	Marsh
February 18	Dredger Field and Pond	900	0.09	Marsh-Meadow
	Total Acres	3,350	$0.32 (average)	

The purposes of our prescribed burns are to stimulate vegetation, create breeding pair habitat, recycle nutrients, and to stimulate the growth of grasses instead of shrubs. Burning plans, EA's and post-burning reports are prepared to keep burning within refuge objectives and to compile information which will be helpful in planning future burns.

Wildlife response to the burns was positive. Greater sandhill cranes, Canada geese and other waterfowl and marsh bird species used the Dredger and White field burns extensively for early spring feeding areas. Response was so positive that C. D. Littlefield had difficulty baiting cranes into his rocket net site with shelled corn near these areas! Grasses which showed tremendous response to fire included: Great Basin wildrye, alkali wildrye, and salt grass. These species greatly increased in density, height and stem strength, which are important habitat characteristics for ground nesting migratory birds. More refined response measurements are planned to be accomplished by the biological staff in 1984.

10. Pest Control

Approximately 45 miles of public refuge roads and levees were sprayed with a 1 percent solution of 2,4-D to kill Canada thistle and perennial pepperweed. Spraying was done with a Bean sprayer and hand wands.

Control was spotty. Because of the abundance of moisture, thistles were found in all stages of development. Incidentally, the best time to kill them is when they are in the bud stage.

Some willow damage was incurred when the low volatile ester 2,4-D volatilized during hot weather.

12. Wilderness and Special Areas

There was no action on the Malheur Wilderness Proposal which has awaited Congressional Action since 1967.

The Squaw Pit Archeological Site was approved for inclusion on the National Register of Historic Places on November 2, 1983. This was the site where two men were apprehended and charged with violations of the Archeological Resources Protection Act (See H.17).

G. WILDLIFE

1. Wildlife Diversity

A total of 294 bird species has been recorded on Malheur Refuge, including 62 that are considered accidental occurrences. In 1983 our list grew by four new species: broad-winged hawk at headquarters on May 29; golden-winged warbler at headquarters on June 3-4; long-tailed jaeger at Derrick Lake on August 10; and red-breasted merganser at Double-O on October 10. Other unusual bird sightings are listed in Table 7.

Table 7. Unusual Passerine Sightings, Malheur NWR, 1983.

Species	Date	Remarks
Winter wren	April 20	Benson Pond
Vaux's swift	May 1	Headquarters
Western kingbird	May 7-8	55 birds roosted in blue spruce at headquarters
Hammond's flycatcher	May 8	Headquarters
Calliope hummingbird	May 8-19	Headquarters
Tennessee warblers	Mid-May	Headquarters
Black-chinned hummingbird	May 19	Headquarters
Ovenbird	May 25	Headquarters
Black and white warbler	May 27	Headquarters
Gray catbird	May 29	Headquarters
Indigo bunting	May 29	Page Springs Campground
Golden-winged warbler	June 3-4	New record for Malheur Refuge
American redstart	June 10	Headquarters
Rose-breasted grosbeak	June 24	Headquarters
Northern waterthrush	Aug 26	Page Springs Campground
Pygmy nuthatch	Sept 4, 9, 18	Headquarters
White-throated swift	Sept 5	Malheur Field Station
Winter wren	Sept 6-Nov 29	Headquarters
Northern waterthrush (2)	Sept 26	Headquarters
Northern flicker	Sept 28	Yellow-shafted
Blackpoll warbler	Sept 28	1 mi W of Headquarters
Northern waterthrush	Sept 28-30	1 mi W of headquarters
White-throated sparrow	Oct 8, 12	Headquarters
Blackpoll warbler	Oct 13	Headquarters

Fifty-eight species of mammals occur on the refuge with six more listed as occurring historically and six listed as possible occurrences. In 1983 one unwelcome species was confirmed when a red fox was trapped in the Double-O grain field on February 28. The fox was photographed and the skull stored at the headquarters. The fox, which is the first known record for the refuge, was taken in one of our best duck producing areas. Since we already have serious predation problems with coyotes and ravens, this is one case where we prefer our species diversity would not increase.

2. Endangered and/or Threatened Species

No peregrine falcons were seen on the refuge in 1983; however, one was seen on nearby Steens Mountain on September 19 and again on October 12.

The bald eagle, a threatened species in Oregon, is a common winter visitor and spring migrant. In 1983, BLM funded a cooperative bald eagle study in the Malheur-Harney Basin. The study was conducted by private contractor, Frank Issacs, and refuge personnel assisted with periodic censuses. The peak count for the basin occurred the week of February 28 - March 6, when 173 bald eagles were counted. This coincides with our peak in spring migrant pintails and tundra swans. A major bald eagle feeding area was Unit 6, the east side of Malheur Lake, where eagles preyed on wintering and spring migrant waterfowl. Nine communal night roosts were located in the basin by Issacs, with the largest roost located on BLM and Forest Service lands northeast and northwest of Burns. A mid-winter bald eagle count of 25 birds was recorded on January 6.

3. Waterfowl

The record abundance of water in the Great Basin, and the Malheur-Harney Basin in particular, scattered waterfowl populations widely. Because of the flooded wetlands off-refuge, our waterfowl use was down dramatically, in some cases setting all-time low records.

The mid-winter waterfowl survey revealed 6,200 Canada geese, a resident population of 52 trumpeter swans and 600 ducks using the refuge. By February 22, northern pintails, tundra swans and snow geese had arrived. Peak numbers and dates for selected spring migrants appear in Table 8.

Table 8. Estimated Spring Waterfowl Peaks, Malheur NWR, 1983.

Species	Number	Period
Tundra swans	15,546	March 2
Canada goose	6,650	Mid-winter
Snow goose	47,830	March 16
Mallard	1,115	March 16*
Northern pintail	18,265	April 1
Green-winged teal	450	March 3
American wigeon	7,025	April 1
Northern shoveler	1,655	April 1
Canvasback	1,205	April 1
Ruddy duck	7,210	May 3

*No spring "peak" of migrant mallards was ever detected; however, by late May our breeding population was estimated at 4,100.

As Malheur Lake levels increased and the water spread out, spring migrants concentrated on newly flooded shallows on private land where they were not counted. Total spring duck use on the refuge

was half that of recent years (Table 9). The most notable declines occurred on Malheur Lake, which is now a lake rather than a marsh. Deep water nearing 10 feet, widespread failure of emergent vegetation and a nearly total decimation of sago pondweed virtually eliminated most of the spring waterfowl maintenance on Malheur Lake. It is amazing, sad and frustrating to see 60,000 acres of water on a refuge with virtually no birds using it.

Table 9. Spring Waterfowl Use-days, Malheur NWR, 1979-83.

	Use-days in Thousands				
Species	1979	1980	1981	1982	1983
Tundra swan	167	178	425	133	295
Trumpeter swan	3.2	4.3	9.1	7.8	7.4
Geese	1,287	875	1,062	1,974	2,465
Ducks	3,372	3,319	3,466	3,653	1,525
Totals	4,829.2	4,554.3	4,962.1	5,767.8	4,292.4

Spring goose use continued to increase, primarily due to snow and Ross' geese that are beginning to ultilize new grain fields that have been put into production on private lands in the last few years. In March 1982, a basin-wide white goose count revealed 110,00 birds. We were unable to repeat this census in 1983, but it was apparent that spring use by snow and Ross' geese has definitely been up in the basin the past few years.

Spring snow goose numbers continue to increase in the Harney Basin; however, most of the use is on private land north of the refuge.

BDE

Spring goose use exceeded duck use this year. This has never been recorded before on Malheur Refuge.

The duck breeding population was an estimated 11,800 pairs, which is down considerably from the post-carp control years of 1978-80 (Table 10). Causes of the decline are twofold: 1) record high water inundated much of the uplands for dabblers and removed emergents for divers and 2) high carp populations coupled with deep water eliminated sago pondweed on Malheur Lake, which is essential to attract breeding hens, particularly redhead and ruddy ducks. The most common nesting duck in 1983 was the cinnamon teal, followed by redhead, mallard and gadwall.

Table 10. Estimated Waterfowl Breeding Pairs, Malheur NWR, 1983.

	1980	1981	1982	1983	% Change from 1982
Trumpeter swan	18	15	16	16	0
Canada goose	595	813	1,427	1,379	- 3.3
Ducks					
Mallard	2,485	2,170	1,662	2,012	+ 21.1
Gadwall	2,285	2,107	1,521	1,466	- 3.6
Pintail	467	242	292	379	+ 29.8
Green-winged teal	228	141	154	84	- 45.5
BW/Cinnamon teal	4,016	4,260	3,643	3,991	+ 9.6
American wigeon	420	240	136	176	+ 29.4
Northern shoveler	1,056	665	705	511	- 27.5
Wood duck	0	0	0	0	0
Dabbler Subtotal	10,957	9,825	8,113	8,619	+ 6.2
Redhead	6,012	3,062	2,006	2,176	+ 8.5
Canvasback	678	380	310	453	+ 46.1
Lesser scaup	77	0	10	39	+290.0
Ring-necked duck	13	0	5	27	+444.0
Ruddy duck	2,554	1,116	602	457	+ 24.1
Common merganser	22	3	0	29	0
Diver Subtotal	9,356	4,561	2,933	3,181	+ 8.4
Total Ducks	20,313	14,386	11,046	11,800	+ 6.8

Total duck production was estimated at 23,705 with the major species shown in Table 11. This production is half of what it was 3 years ago. Again, the area of biggest decline was Malheur Lake. The estimated duck production for this 60,000 acre segment of marsh/lake was only 1,130 birds, a 96 percent decline since 1980 (Table 12).

Table 11. Duck Production Trends of the Major Nesting Ducks on Malheur NWR, 1979-83.

Species	1979	1980	1981	1982	1983	Average 1979-83
Mallard	5,635	7,515	5,040	2,920	3,630	4,948
Gadwall	7,650	8,185	5,780	4,700	4,410	6,145
Blue-winged/ Cinnamon teal	7,795	8,585	6,930	7,230	6,420	7,392
Redhead	15,750	13,525	6,845	4,490	5,195	9,161
Ruddy duck	4,570	4,505	1,975	1,080	775	2,581
Total	41,400	42,315	26,570	20,420	20,430	30,227

Table 12. Malheur Lake Waterfowl Production (Dabblers/Divers) and Aerial Brood Trend Count.

Year	Dabbler Production	Diver Production	Total Production	Brood Trend Count
1976 (wet)	3,050	4,950	8,000	26
1977 (Drought)	2,525	1,775	4,300	25
---------- Carp Control ----------				
1978 (Wet)	3,730	11,000	14,730	109
1979 (Wet)	4,225	18,400	22,625	134
1980 (Wet)	5,180	20,665	25,845	35
1981 (Wet)	5,970	7,455	13,425	32
1982 (Record Wet)	2,680	2,040	4,720	12
1983 (Record Wet)	470	660	1,130	3

The trumpeter swan population was not adversely affected by the record high water of Malheur Lake, since most pairs nest elsewhere on the refuge. Eighteen swan pairs were observed on territories in June. Seven nests were successful with 28 cygnets known to have hatched. Only 17 cygnets in six broods reached flight stage. The average number of birds raised to flight stage from 1958-82 was 10.6 cygnets, so 1983 was a good year for trumpeters.

Canada goose production was estimated at 2,550 young to flight stage from an estimated 1,379 breeding pairs. This was the highest production on the refuge since 1958 when an estimated 3,109 were produced. Apparently intensive predator control in 1983 in conjunction with greater sandhill crane research (See D.5, MLH-26) has secondary benefits for Canada geese. Predator control efforts concentrated on coyotes and common ravens. Past studies at Malheur have shown ravens to be very effective predators on Canada goose nests. So control efforts directed to increase sandhill crane nest success apparently benefited Canada geese and other nesting birds as well.

The fall waterfowl migration passed with no major build-up of any migrants. The high water which left much of Malheur Lake too deep for feeding, combined with the near total failure in sago pondweed production, make the fall migration of 1983 the lowest in recent years (Table 13). One species which reflects the present condition of Malheur Lake is the tundra swan. In 1983, swans peaked at 327 during the fall migration, whereas the average peak for the past 25 years is 5,450. Similar declines for other species are listed in Table 14. One of the few reminders that a fall migration was in progress was the occasional passing of snow geese or tundra swans over the headquarters. Most waterfowl flew over the refuge and if they stopped, it was only for a short time.

Table 13. Fall Waterfowl Use-days, Malheur NWR, 1979-83.

	Use-days in Thousands				
Species	1979	1980	1981	1982	1983
Tundra swan	235	177	46	339	13
Trumpeter swan	9.0	11.1	7.8	8.6	9.0
Geese	577	734	735	1,304	561
Ducks	10,451	10,245	5,827	5,621	3,688
Total	11,272	11,167.1	6,615.8	7,272.6	4,854

Table 14. Estimated Fall Waterfowl Peaks, Malheur NWR, 1983.

	1983		Recent Fall Peaks	
Species	Number	Period	Number	Year
Tundra swan	327	Oct 24	31,230	1980
Canada goose	7,465	Nov 25-Dec 15	10,625	1983
Snow goose	895	Nov 7	8,000	1979
Mallard	5,735	Nov 7	31,230	1980
Pintail	7,105	Aug 3	94,170	1980
Green-winged teal	3,860	Oct 25	17,750	1982
American wigeon	8,275	Aug 3	21,440	1979
Northern shoveler	1,545	Aug 3	22,580	1979
Redhead	5,485	Aug 3	17,700	1979
Canvasback	1,755	Oct 24	20,950	1979

Coots peaked at 37,520 on April 1 and again at 27,985 on August 3. Estimated refuge production was 19,980, less than half the production of recent years. Coot use on the refuge portion of Malheur Lake was greatly reduced as high water eliminated emergent vegetation necessary for nesting. However, coots responded very favorably to newly flooded habitat north of our boundary on Malheur Lake.

Hundreds of nesting coots were observed on both sides of Highway 205, north of the Narrows. Nest densities in some places were so high that they took on the appearance of colonies. Nesting in flooded greasewood shrubs was common. Estimates for off-refuge coot production and use were not attempted. Total coot use for the refuge was 4.75 million use days, which is lower than normal.

4. Marsh and Water Birds

Over 60 great blue herons, one great egret, a few American bitterns and a few pied-billed grebes wintered on the refuge. The first spring arrivals for marsh and water bird species were recorded in early March through April. Black-crowned night herons arrived on March 2 (the previous early arrival record was March 7, 1966). A common loon was observed at the Narrows bridge from April 12-25. Several horned grebes were recorded on the refuge during the spring.

As in 1982, record high water levels in Malheur Lake, Mud Lake and Harney Lake influenced the selection of nesting locations of colonial nesting water birds. The main colony on Malheur Lake was situated on floating mats of hardstem bulrush in the northern portion of Unit 5, near the mouth of the Silvies River. Rapidly rising water levels, coupled with wave action, apparently inundated many nests and caused several hundred birds to abandon this site. The cormorants and some great blue herons moved to colonies at Benson Boat Landing and at the lone cottonwood near the mouth of the Silvies River. Most black-crowned night herons relocated to the colonies on the Island Ranch.

Table 15 summarizes nest estimates and production for water birds in the Malheur-Harney Lakes Basin, 1983. Double-crested cormorant nest estimates were the second highest on record, just slightly below the peak numbers recorded in 1982. Their primary nesting site was the dead trees at Benson Boat Landing. They were observed nesting in the cottonwood tree at the mouth of the Silvies River, in the main Malheur Lake colony, and off-refuge on the Island Ranch.

The estimate of 450 great blue heron nests is the second highest recorded for the Basin since the peak record of 600 nests in 1918. The rising Malheur Lake level did not impact the earlier-nesting great blue herons to the extent that it did other species, although many birds apparently were displaced to Vickers Lake, Cottonwood, Benson Boat Landing and Island Ranch colonies.

Nest estimates for black-crowned night herons were 46 percent above the average nest estimates for the past 18 years. As the Malheur Lake level rose, the night herons abandoned Malheur Lake and joined colonies on the Island Ranch. Night herons also nested at Vogler Swamp and Silver Lake Pond colonies.

Great egret nest estimates this year were 39 percent higher than in 1982, the previous record. Nests in Malheur and Harney Lake colonies experienced low success, probably due to rising waters and wind action. Colonies on the Island Ranch and at Vickers Lake were quite successful.

Table 15. Nest Estimates for Colonial Birds in the Malheur-Harney Lakes Basin, 1983.

	Malheur Lake	Vickers Lake	Island Ranch	Vogler Swamp	Benson Boat Landing	Cottonwood Tree	Harney Lake-Tanowama	Silver Lake Pond	Warbler Pond	Culp Cattle Company	Lava Beds Field	Mud Lake	Basin Total	Basin Production
Double-crested cormorant	125	0	10	0	280	50	0	0	0	0	0	0	330	745
Great blue heron	200	23	110	0	40	75	2	0	0	0	0	0	450	940
Black-crowned night heron	250	11	650	85	0	0	0	35	0	0	0	0	800	1950
Great egret	150	55	650	0	0	0	10	0	0	0	0	0	765	1530
Snowy egret	0	0	100	0	0	0	0	0	0	0	0	0	100	180
White-faced ibis	0	0	400	20	0	0	0	0	0	0	0	0	420	1020
Franklin's gull	0	0	0	150	0	0	0	0	0	0	0	0	150	0
California gull	0	0	0	0	0	0	0	0	0	400	0	0	400	500
Ring-billed gull	0	0	0	0	0	0	0	0	0	25	0	0	25	50
Forster's tern	0	0	0	20	0	0	50	15	30	0	20	0	135	280
Caspian tern	0	0	0	0	0	0	3	0	0	0	0	0	3	5
Western grebe	1445	0	0	0	0	0	400	0	0	0	0	100	1945	8750

Snowy egrets nested only in the Island Ranch colony. The estimated 100 nests is slightly above the average estimate for the past 18 years.

White-faced ibis (sensitive species) nested in the Island Ranch colony and in small numbers at Vogler Swamp; both sites are off-refuge. There was a considerable drop from 1982's record of 900 nests to 420 nests in 1983.

An estimated 3,890 pairs of western grebes nested on Malheur, Harney and Mud lakes. It appears that overall the high water benefited this species. An estimated 8,750 young were produced. Eared grebes nested in the small colonies scattered at various locations throughout the basin. The largest concentration was on Boca Lake, where an estimated 500 pairs were nesting.

Single common loons were noted on Harney Lake on October 24, near the Double-O substation on October 31 and at the refuge headquarters from November 26 through December 9. A lone arctic loon was observed on December 4 at the Narrows. A few pied-billed grebes remained on the refuge through the end of the year. An aerial survey on November 7 revealed 1,285 double-crested cormorants. Not only is this number much higher than normal, but to have this many cormorants so late in the season is remarkable. Apparently, mild weather and an abundance of carp held this species in the area for a longer than normal period. Three white-faced ibis lingered in the basin through November 6. A total of 37 great egrets was seen during the aerial survey on November 7, and one was known to winter at the Double-O. Great blue herons were regularly seen through the end of the year. White pelicans, a sensitive species, were first noted April 1. By the end of May, populations increased to 400. An estimated 1,200 were present in early July. The fall peak for pelicans was 915 on September 21, and six were still on the refuge on November 28.

Through a cooperative agreement between the Service and the Oregon Department of Fish and Wildlife, an attempt was made to attract white pelicans to nest on the refuge. An island in Malheur Lake was burned and treated with a soil sterilant to remove vegetation. Unfortunately, rising lake levels inundated the island.

The refuge greater sandhill crane (sensitive species) nesting population has been declining slightly for the past 10 years (236 pairs in 1971 to 214 pairs in 1982). Refuge production improved this year, with 39 young cranes reaching flight stage. Other populations of sandhill cranes which are stable or increasing are averaging 10-12 percent annual recruitment. Annual recruitment for the refuge breeding population was 9.1 percent this year. The annual recruitment rate for 1975-83 has averaged 6.6 percent for the refuge subpopulation and 6.9 percent for the entire Central Valley population. Nesting success this year on the refuge was high, with 63.3 percent of the nests checked hatching at least one colt. Table 16 depicts nest fates by vegetation type. Mortality from the time of hatching to fledging remains high. In 1983, 84.8 percent of the colts died before they could fly (Table 17). The major problem appears to be predation, principally by coyotes.

Table 16. Greater Sandhill Crane Nest Success by Vegetation type on Malheur NWR, 1983.

Surrounding Vegetation	No.	No. Succ.	% Succ.	Raven	Raccoon	Coyote	Unknown Predator	Infertile	Abandoned	Flooded
Burreed	15	10	66.7	---	1	2	1	---	---	1
Hardstem bulrush	30	21	70.0	2	3	---	2	1	1	---
Cattail	3	1	33.3	1	---	---	---	---	---	1
Juncus	5	3	60.0	---	---	1	1	---	---	---
Cattail/burreed	1	0	0.0	---	---	---	---	---	1	---
Alkali bulrush	1	1	100.0	---	---	---	---	---	---	---
Sedge	1	1	100.0	---	---	---	---	---	---	---
Alkali wildrye	4	1	25.0	---	1	1	---	---	---	1
Total	60	38	63.3	3	5	4	4	1	2	3

Table 17. Percent Young Greater Sandhill Crane Mortality From Time of Hatching to Time of Fledging, Malheur NWR.

Year	Percent Young Mortality
1970	66.5
1971	80.7
1973	98.0
1974	98.8
1976	84.6
1977	85.5
1978	70.1
1980	84.9
1981	88.7
1982	90.1
1983	84.8
Average	84.8

One greater sandhill crane wintered on the refuge in 1983. The first migrants arrived on February 16. Fall staging populations on the refuge peaked at 2,295 on October 1. The majority of the population rapidly departed on October 10, about one month earlier than normal, when roost sites dried up due to repair work on refuge dikes. By October 19, only five cranes were present. One lone crane was still present as late as December.

5. Shorebirds, Gulls, Terns and Allied Species

Record high water levels reduced shorebird use of refuge lands. Most shorebird use occurred on the edges of Malheur and Harney lakes on private and BLM lands.

A few killdeer wintered on the refuge and migrants began arriving on February 15. A small area of flooded pasture west of the refuge headquarters held several uncommon shorebirds, including a black-bellied plover (April 30-May 14), a dunlin, a red knot, a semi-palmated plover and a ruddy turnstone (mid-May). Avocets and black-necked stilts were present in reduced numbers this year. Long-billed curlews were present in normal numbers. Their migration peaked in mid-April. Wilson's phalaropes began arriving April 28 and northern phalaropes were first seen on May 14.

Ring-billed gulls began arriving February 19 and California gulls arrived on March 15. Franklin's gulls were first noted on April 6 and three Bonaparte's gulls were seen on April 21 near refuge headquarters. Forster's, Caspian and black terns arrived on schedule,

and there were scattered colonies of Forster's and black terns on and near the refuge.

Franklin's gulls nested off refuge at Vogler Swamp, but were unsuccessful. The estimated 150 pairs is the lowest estimate for the basin since 1977.

A nesting colony containing an estimated 400 California gull and 25 ring-billed gull nests was located on the Culp Ranch near Burns. An estimated 550 young were produced in this colony.

Forster's tern nesting colonies were noted at Silver Lake Pond, Vogler Swamp, Harney Lake (Tanowama Marsh), Lava Beds Field, Warbler Pond and Malheur Lake. Undoubtedly, there were more colonies on marshes on and near the refuge that were undetected.

Three Caspian tern nests were observed on Tanowama Marsh. This is the first nesting by this species on the refuge since 1960. The birds were nesting on floating mats of bulrush in association with Forster's terns and western grebes.

No snowy plovers were seen in 1983, as high water eliminated all nesting habitat. If a similar situation existed throughout the Great Basin, the inland nesting population has surely been affected. Possibly this could be the major limiting factor for the species and populations should be monitored closely. Hopefully, alternate nesting areas were used; otherwise the population has surely suffered. A single sanderling was seen on the refuge on June 8. A whimbrel was observed near Double-O on July 14 and seven northern phalaropes were recorded on June 5 in the same area. Much of the habitat for long-billed curlew, willet and Wilson's phalarope was under water in 1983 and what influence this has had on the local nesting population is unknown. A single Bonaparte's gull was seen at the Narrows on June 14. Both black and Forster's terns were present in good numbers and Caspian terns continue to increase. About 200 individuals were present throughout the period.

The fall shorebird migration was not impressive as far as numbers were concerned, but interesting. High water covered most mud flats that had been present in past years. Available habitat included road sides, which provided excellent opportunities for observations. Semipalmated plovers were noted in August, with the last sighting on September 27. The previous latest fall record was September 7. The first records since 1967 for lesser golden-plovers were established in 1983. Two were seen on September 19 and an additional bird was observed by Merle Archie on September 28. Observations were at two separate locations, and apparently represented three individuals. Black-bellied plovers were noted on September 2 and September 27. A red knot was recorded on August 21 (M. Archie) for one of the few refuge records. Ruddy turnstones may be more common than records indicate. The species was seen from August 15 through September 2. Their peak number was five on September 2.

Other noteworthy shorebirds include lesser yellowleg (August 15-September 8), pectoral sandpiper (August 20-September 22), sanderling (September 13-25), Baird's sandpiper (September 1-October 10 - previous late date September 19) and marbled godwit (August 13-26). These species were seen on several occasions between the extreme dates; however, their numbers were usually small.

During an aerial waterfowl-pelican survey on August 19, a long-tailed jaeger was closely observed by Dave Paullin and Mark Smith. This represented the first southeast Oregon record, if not the first record for eastern Oregon. Bonaparte's gulls were evident around west Malheur Lake and Harney Lake. Flocks of up to 14 were seen from mid-August through mid-September. Caspian terns remained common through much of September. About 150 individuals loafed regularly on flooded roads near Malheur and Harney lakes through August. A few killdeer, common snipe, and ring-billed gulls were noted on the Christmas bird counts in December.

6. Raptors

On May 29 a broad-winged hawk, a new record, was observed at the headquarters by several bird watchers. Other unusual raptor sightings this year included a Merlin at P-Ranch on March 18, saw-whet owl at headquarters on September 25 and a western screech owl at Page Springs Campground on November 28. This year's high water was particularly attractive to ospreys. The first osprey was observed on April 22 and one remained the entire summer, staying at the Narrows until mid-September. During the spring, at least three osprey were known to spend several weeks in the following areas of the refuge: Knox Ponds, headquarters-Narrows and the Double-O substation. It is hoped that possibly two of these birds might get together and show some interest in nesting in the future. The refuge has no nesting records for osprey; however, the lone osprey at the Narrows spent almost the entire summer perched in the lone willow tree which is now entirely surrounded by water. This large tree is potentially ideal for osprey nesting.

Quarterly raptor surveys were conducted this year and are summarized in Table 18. The census, initiated in 1975, includes 15 routes covering 278 miles throughout various habitats of the Harney Basin. During the winter census, ferruginous hawks were recorded for the first time.

In general, 1983 was a year of overall low raptor abundance. High water and low jackrabbit populations are the probable causes of this decline. One raptor particularly sensitive to jackrabbit populations is the golden eagle. For the past 18 years, 22 golden eagle nests have been monitored on or near the refuge, with annual productivity compared to the jackrabbit abundance. This year, 22 eagle nests were checked; only three young fledged. This tied the previous low record set in 1973, another low rabbit year

Table 18. Quarterly Raptor Surveys, Malheur NWR, 1983

Species	Number Observed			
	Winter	Spring	Summer	Fall
Turkey vulture	0	50	43	109
Sharp-shinned hawk	0	1	0	0
Cooper's hawk	0	0	0	0
Red-tailed hawk	16	56*	36	31**
Swainson's hawk	0	2	7	23
Ferruginous hawk	1	5*	3	1
Golden eagle	11*	11**	13	6
Bald eagle	4	0	0	0
Prairie falcon	1**	4	1**	1**
American kestrel	3	15	14	44
Northern harrier	15	102*	30	7
Rough-legged hawk	114	18	0	0
Great-horned owl	0	2	0	1
Unknown buteo	0	7	3	4
Short-eared owl	0	3	1	0
Black-billed magpie	17	16	7	6
Common raven	110	144	152	201
Common crow	0	62*	29*	35
Loggerheaded shrike	0	4	15*	26
Norhtern shrike	0	4	0	0
Osprey	0	0	1	0
Burrowing owl	0	0*	3	0

* Record high
**Record low

7. Other Migratory Birds

Table 7 (See G.1) summarizes some of the more unusual passerine sightings of 1983.

Says' phoebes arrived on schedule (February 22). Tree swallows arrived earlier than usual on February 24; their average arrival is not until March 10. Common ravens were not as abundant as they were in 1981-82. A total of 110 was recorded on raptor surveys. Two roost sites were known active - one of about 310 birds in Catlow Valley and another of about 200 birds near Burns. Mild weather probably resulted in birds dispersing into surrounding regions earlier than normal, as one roost in late November contained well over 600 individuals. Black-billed magpies were common in localized areas. On December 20, 96 were recorded about 10 miles south of headquarters, but generally the species was widely scattered and only 17 were recorded on 242 miles of raptor counts in February.

Neither brown creepers nor any nuthatches were seen at the headquarters during the spring, which is unusual. Ruby-crowned

kinglets arrived on April 1 and were common this spring. At least five bobolinks had returned to P-Ranch by May 22. No new arrival dates were set during the spring migration.

Eastern kingbirds showed a drastic decline in 1983. Only one pair nested along the Blitzen River in an area where normally five pairs nest. Few other pairs could be located in the basin. One pair of ash-throated flycatchers was seen on June 13 near Page Springs near Frenchglen. A red-breasted nuthatch was at the refuge headquarters on July 13, indicating a reduction of food resources in the mountainous areas. A late sighting of a crown creeper was made at the headquarters on June 6. One species noteworthly by its absence was the house finch. No observations were made during this period.

The only common barn-owls recorded during the period were one at headquarters on October 26 and one seen regularly at Malheur Field Station throughout the period. A screech owl was at Page Springs Campground, near Frenchglen, Oregon on November 28. Short-eared owls were scarce during the period, reflecting a reduction in the small mammal population. A northern saw-whet owl was at headquarters on September 25 (Steve Summers, Jim Carlson).

Common nighthawks continued to be low in numbers. Few migrated through the basin compared to past years. It is undetermined whether there has been a decline of total numbers within the Great Basin or if local weather conditions in the northern Great Basin are having an influence. Poor-wills have also seemed fewer in numbers the past two years than formerly.

An olive-sided flycather was seen at the headquarters on August 23, somewhat earlier than normal. Mountain chickadees were more common in the desert lowlands than any year since 1970. First noted on the refuge on September 19, the species became common in October. By November 1 the species had disappeared. Red-breasted nuthatches were abundant after July. As many as five in a single tree at refuge headquarters could be seen in August and September, but by October most had left. Golden crowned kinglets were more common than usual in lowland areas in late September and early October. Northern shrikes arrived on October 18, but no large numbers have been seen. This is possibly another species which is being influenced by low rodent populations.

In July 1982, the Service issued its list of Sensitive Species for Region 1. At Malheur Refuge we have seven sensitive species that either nest or occur regularly: white pelican, trumpeter swan, Swainson's hawk, greater sandhill crane, western snowy plover, willow flycatcher and loggerhead shrike. Current research and monitoring include spending at least some effort on all these species (see D.5), G.4 and G.6). An additional three species on the Region 1 list use the refuge infrequently: common loon, Lewis' woodpecker and western bluebird.

The common raven receives extra attention at Malheur because it has been documented to be a major egg predator. During the winter months, common ravens congregate in communal night roosts which lend themselves very well to monitoring and censusing. There are six known roosts in the Harney Basin, three of which are on the refuge. In late November, four of these roosts were active. A total of 1,035 common ravens were counted in the following roosts: Burns airport (380); Narrows (200); southeast Malheur Lake (280); and Catlow Valley (175).

Raven nesting activity was monitored again in 1982 in conjunction with our sandhill crane predation study (see D.5, MLH-26). All known raven nests (15) in the Double-O and P-Ranch area were checked and determined to be inactive. In both of these areas, ravens have been controlled during the past two years with DRC-1339 under an experimental use permit. DRC-1339 is proving to be a very effective and selective control method. In the non-control area (Buena Vista, Malheur Lake and Sodhouse), 34 nests were checked, 19 of which were known active.

Additional activities this year included conducting two Christmas Bird Counts and four Breeding Bird Surveys.

10. Other Resident Wildlife

The annual Malheur Lake muskrat house count (aerial) was conducted on February 4. This year's census documents a dramatic crash (to 13,865) in muskrat numbers from last year's record high estimate of nearly 60,000 animals. This die-off was very evident beginning in the spring of 1982 (March-June) when muskrat carcasses were common throughout the lake. The muskrat die-off was particularly attractive to migrant bald eagles in March and to uncommonly high numbers of common ravens and raccoons through the entire die-off period.

A lethargic and obviously "sick" muskrat was collected in July on Malheur Lake and sent to the National Wildlife Health Lab in Madison, Wisconsin. Tularemia was suspected, but laboratory tests proved negative. The final diagnosis was hepatitis of unknown cause, with Bacillus piliformis (Tyzzer's disease) suggested as a possible cause.

Muskrat numbers on the Malheur Lake continued to be low throughout 1983. High water, together with a dramatic decline in hardstem bulrush, further reduced muskrat numbers. One area where muskrats are now particularly evident is the newly flooded private land along north Malheur Lake, particularly southeast of Lawen. This area was not censused; however, these apparently displaced rats are only a small fraction of the estimated 60,000 animals (5 per house) present on Malheur Lake during the winter of 1981-82.

These muskrats photographed at the Narrows "hung on" as Malheur Lake rose to record levels.

DFK

11. Fisheries Resources

Carp populations remained high in Malheur Lake. The tremendous increase in water volumes in both Malheur and Harney lakes made them less evident except when they entered shallow water to spawn. Carp have also spread into Harney Lake. Normally Harney Lake is too alkaline for fish; however, this year's voluminous runoff changed it into a fresh water lake. Carp populations are expected to explode next year because of the large expanse of shallow water throughout the basin.

Krumbo Reservoir and Krumbo Creek (1 mile upstream) were rotenoned on October 26 and 27. ODFW fisheries personnel assisted the refuge biological crew during this operation. The poisoning was conducted to eliminate, if possible, the rough fish population of tui chubs prior to restocking. The reservoir was drawn down to repair the dam which was heavily damaged during a 1979 flood. The following fish were killed in Krumbo Reservoir: 3,000-4,000 tui chub (average 6 inches - some up to 12 inches), 200 rainbow trout (average 17 inches - some up to 22 inches), 50 large-mouth black bass (average 4 pounds - 15 over 7 pounds) and 75 white crappies (average 12 inches). An additional 2,000-3,000 rainbow trout were killed in Krumbo Creek. No tui chubs were found in the creek, although their presence was suspected by ODFW personnel. The reservoir will be restocked in the spring of 1984 by ODFW with large-mouth black bass, white crappie and rainbow trout. The predatory black bass are expected to keep any remaining tui chub under control. Krumbo Reservoir is used mainly as a source of late summer water to maintain waterfowl brood habitat. Recreational fishing is an added benefit which gives the refuge public relations' effort a boost.

12. Wildlife Propogation and Stocking

ODFW released 5,000 rainbow trout into the Blitzen River at five sites between Page Springs and P-Ranch. The stocking was accomplished on two dates during July. The purpose was to provide recreational fishing near BLM camping areas. This keeps fishing pressure low on upstream habitat where the native red-banded rainbow thrives. ODFW fisheries personnel are currently assessing the status of this native trout and appreciate our cooperation by allowing this stocking to continue.

The river otter reintroduction program continued this year. An immature female was released at the Kado Bridge in the Blitzen River on February 7. An immature male was released at the same site on March 13. This made a total of five otters released near refuge headquarters during the winter of 1982-83. The otters were live-trapped at the ODFW's Wizzard Falls Fish Hatchery near Sisters. They are considered a nuisance because of their depredation of trout at the hatchery. The released otters were observed approximately twenty times near the release site. One otter was also observed in Chickahominy Reservoir west of Riley or about 38 miles northwest of the release site. This otter may have been one of our releases, although there are otters in the forest north of this reservoir. More otters are being requested from ODFW for future releases.

14. Scientific Collection

Seventeen black-crowned night heron eggs were collected from birds nesting in Malheur Lake. The eggs were transferred to Dr. Charles Henny of the Pacific Northwest Field Station, Patuxent Wildlife Research Center in Corvallis, Oregon. He is monitoring egg shell thinning and pesticide levels.

15. Animal Control

In support of the study, "Experimental Control of Predation on Eggs of Greater Sandhill Cranes on Malheur NWR, Oregon" (MLH-26), a private trapper was allowed to trap in the Double-O area, primarily to remove coyotes.

A total of 67 coyotes was removed from Double-O, but the species was still evident at the close of the study in August. As soon as ravens arrived in the study areas, they were mostly eliminated and no estimate of numbers killed was made. Greater sandhill crane nesting success in Double-O was 80 percent and annual recruitment was 10 percent. Crane nesting success in the southern Blitzen Valley was 45 percent, but three nests were flooded and one nest was abandoned of the 20 nests monitored. Nesting success in the area with no predator control was 65 percent. Both rodent and rabbit populations remained at low levels.

The Double-O trapper was also allowed to take other furbearers, excluding river otters and bobcats, to make his efforts worthwhile. The following animals were taken under this permit: muskrat - 258, beaver - 4, raccoon - 2, mink - 3, badger - 2 and red fox - 1. In addition, a trapper was allowed to take problem beavers in the Blitzen Valley in October and November. Twenty-two beavers were removed.

THE NORTH

Photo by PAULINE BRAYMEN

TRANSPLANTING OTTER — Brad Ehlers, biologist with the U.S. Fish and Wildlife Service, lifts lid to release a river otter at the Malheur National Wildlife Refuge in a project to replenish river otter which disappeared from Malheur Lake area in drought of 1934. This otter was trapped by Oregon Department of Fish and Wildlife employees near Metolius.

Project returning otters to refuge

16. Marking and Banding

C. D. Littlefield continued his research on the Central Valley Population of greater sandhill cranes (see D.5, MLH-30). He banded and marked with colored leg bands 43 cranes, including four juveniles. Twenty-one young sandhill cranes were fitted with radio transmitters (see D.5, MLH-27 for the radio-telemetry study). An additional three young cranes were captured in the fall and fitted with radio transmitters. Of the total of 24 cranes with radios, five survived to migrate south. They were being monitored on their wintering grounds by Volunteer Sue Lindstedt.

Twelve trumpeter swans cygnets were banded and collared to trace their movements and mortality (se D.5, MLH-21).

Mallard banding quotas were the same as the previous year, 200 of each age and sex. Juvenile mallard were again hard to come by. Swim-in traps and barley were used to capture ducks, primarily at the Kado Bridge and West Buena Vista Pond. Mallards banded included 207 adult males, 312 adult females, 125 immature males and 66 immature females. In addition, 39 pintails, five blue-winged/cinnamon teal, 10 redheads, and two gadwalls were banded. Table 19 lists numbers and banding locations of birds banded by the refuge in 1983.

Table 19. Numbers and Banding Locations of Birds Banded by Malheur NWR Staff, 1983.

Species	Number Banded (*)	Banding Location
Great blue heron	16	Island Ranch (off-refuge)
Great egret	135	Island Ranch (off-refuge)
Snowy egret	8	Island Ranch (off-refuge)
Black-crowned night heron	75	Island Ranch (off-refuge)
White-faced ibis**	56	Island Ranch (off-refuge)
Trumpeter swan**	12	Blitzen Valley
Canada goose	54	Blitzen Valley
Mallard	710	Headquarters and BV Pond
Gadwall	1	Headquarters
Pintail	39	Headquarters and BV Pond
American wigeon	3	Headquarters and BV Pond
Wood duck	7	Headquarters and BV Pond
Redhead	8	Headquarters and BV Pond
Red-tailed hawk	1	Headquarters
American kestrel	1	Headquarters
Greater sandhill crane**	40**	Unit 10
American coot	16	Headquarters
Least sandpiper	6	Double-O Rd at Harney Lake
Western sandpiper	5	Double-O Rd at Harney Lake
Black-necked stilt	1	Double-O Rd at Harney Lake
Wilson's phalarope	1	Double-O Rd at Harney Lake
California gull	268	Culp Ranch (off-refuge)
Ring-billed gull	15	Culp Ranch (off-refuge)
Northern flicker	2	Headquarters
Lewis's woodpecker**	1	Headquarters

Table 19. Number and Banding Locations of Birds Banded by Malheur NWR Staff, 1983 (continued).

Species	Number Banded (*)	Banding Location
Yellow bellied (red-naped) sapsucker	1	Headquarters
Western kingbird	1	Headquarters
Say's phoebe	3	Headquarters
Hammond's flycatcher	1	Headquarters
Duskey flycatcher	6 (2)	Headquarters
Western flycatcher	1	Headquarters
Western wood pewee	8 (7)	Headquarters
Tree swallow	1	Headquarters
Cliff swallow	29	Headquarters
Red-breasted nuthatch	22 (22)	Headquarters
Brown creeper	2	Headquarters
House wren	1	Headquarters
Winter wren	1 (1)	Headquarters
American robin	18	Headquarters
Varied thrush	3	Headquarters
Hermit thrush	6	Headquarters
Swainson's thrush	1	Headquarters
Townsend's solitaire	7	Headquarters
Golden-crowned kinglet	6 (6)	Headquarters
Ruby-crowned kinglet	60 (34)	Headquarters
Cedar waxwing	1	Headquarters
European starling	1	Headquarters
Solitary vireo	5	Headquarters
Warbling vireo	18 (6)	Headquarters
Orang-crowned warbler	6 (4)	Headquarters
Nashville warbler	30 (4)	Headquarters
Yellow warbler**	38 (25)	Headquarters
Yellow-rumped (Audubon's) warbler	97 (40)	Headquarters
Yellow-rumped (myrtle) warbler	1	Headquarters
Townsend's warbler	5 (1)	Headquarters
Ovenbird	1	Headquarters
Northern waterthrush	1 (1)	Headquarters
Mac Gillvray's warbler	2 (2)	Headquarters
Common yellowthroat	1 (1)	Headquarters
Wilson's warbler	33 (26)	Headquarters
Yellow-headed blackbird	12	Headquarters
Red-winged blackbird	2	Headquarters
Northern oriole	2	Headquarters
Brewer's blackbird	3	Headquarters
Brown-headed cowbird	1	Headquarters
Western tanager	3	Headquarters
Rufous-sided towhee	8	Headquarters

Table 19. Number and Banding Locations of Birds Banded by Malheur NWR Staff, 1983 (continued).

Species	Number Banded (*)	Banding Location
Lazuli bunting	4	Headquarters
Dark-eyed junco	13 (7)	Headquarters
Chipping sparrow	1 (1)	Headquarters
White-crowned sparrow	1	Headquarters
Fox sparrow	2	Headquarters
Total banded	1,951	

* Number banded under C. D. Littlefield's banding permit.
** Sensitive species.
*** Additionally, 11 greater sandhill cranes were banded at Sycan Marsh, Lake County.

17. Disease Prevention and Control

No disease outbreaks were noted this year.

The station Honda ATV and yellow airboat were loaned in September to Stillwater NWR, Nevada for botulism control efforts.

H. PUBLIC USE

1. General

Total visits dropped significantly this year due to flooding conditions which caused road closures (Table 20). The State Highway Department closed State Highway 205 at the Narrows in early June. Local residents drove through the water until mid-November. However, visitors were greeted by a road closure sign at the intersection of State Highways 205 and 78 east of Burns. Traffic was routed through Crane and Princeton to the refuge headquarters. The Double-O and Princeton county roads were also flooded periodically, making travel difficult. Visitor use peaked as usual in May with 6,920 visits. This use is in response to the increased diversity of birds during this time. Over 15,000 less visits occurred from June through November due to the road closure.

State Highway 205 at the Narrows was used more by gulls and carp than by refuge visitors.

BDE

Table 20. Estimated Total Yearly Visits, Malheur NWR, 1976-83.

Year	Visits	Year	Visits
1976	35,810	1980	26,185
1977	29,260	1981	35,885
1978	37,865	1982	36,395
1979	31,325	1983	19,880

2. Outdoor Classrooms - Students

Malheur Field Station (MFS) college classes account for most of the use in this category. MFS is located on the refuge at the former Job Corps Center, 4 miles west of the headquarters. These classes frequently use the Coyote Buttes Environmental Study Area as an outdoor classroom. Students from MFS and local schools also assisted with refuge banding projects.

3. Outdoor Classrooms - Teachers

A teacher workshop was planned and advertised through MFS. It was scheduled for the teachers' in-service day in mid-October. Since only three applications were received, the workshop was canceled.

5. Interpretive Tour Routes

An estimated 4,800 visitors (24% of total use) used the 42-mile Blitzen Valley self-guiding Auto Tour Route. The tour route leaflet has been rewritten at the station level. After Regional Office review we hope to have the complete leaflet printed in spring, 1984. Dan O'Neal, Outdoor Recreation Planner, Umatilla NWR, was detailed to Malheur to assist with rewriting this leaflet. Dan's expertise was welcomed.

Excess water and an abandoned muskrat hole combined to close the Auto Tour Route for several months during the summer. DFK

6. Interpretive Exhibits/Demonstrations

The Benson Memorial Museum again attracted the most visitors. An estimated 8,050 visitors (41% of total use) viewed this exhibit. This museum contains nearly 200 species of birds which were mounted by George Benson and Patricia Hansen in the 1930's and 40's.

Further interpretation of this major attraction is planned for the near future.

Planning for the visitor reception-area interpretive exhibit was completed by the Regional Office I&R staff. The exhibits will be wall hangings and a central free-standing display. They will explain the refuge objectives and the role of Malheur in the flyway. This project will be implemented as soon as funding becomes available.

7. Other Interpretive Programs

Slide programs were shown to the visiting public from April 1 through August at regularly scheduled times on weekends and also upon request. The general orientation program was shown most frequently and serves the needs of a wide variety of groups. Volunteer Ellen Kelley handled the office reception duties on weekends this year. It was not uncommon for her to greet a hundred birders at the headquarters on a Saturday in May. This area is the perennial hotspot for a wide variety of songbirds.

The second annual Migratory Waterfowl Festival was held at the Grange Hall near Burns on April 8-10. Attendance totaled 700 for a threefold increase over the previous year. Brad Ehlers and Dave Paullin showed movies and gave guided tours of the entire Harney Basin, including the refuge. Numerous bird clubs from Oregon and all of the surrounding states were present. This annual event was sparked by former refuge manager John Scharff, a resident of Hines. The event continues to provide the refuge with an excellent interpretive opportunity.

8. Hunting

The Malheur Lake Waterfowl Hunt opened on October 15 and will close on January 15, 1984. Daily bag limits were seven ducks and three Canada geese. The only species restriction was a daily bag of two either/or canvasback and redhead.

Hunter use of Malheur Lake this year was negligible due to the flooding of the access roads. All major refuge accesses were flooded and State Highway 205 was closed to the public due to road construction. The only access to the lake was a long paddle along a road right-of-way or across private land. Excellent hunting was available on private lands north of the lake. All of these factors resulted in a mere twenty visits on the refuge for the entire season!

The Blitzen Valley pheasant hunt was held during the last nine days of the state season (November 19-27). The open area extended from Diamond Lane to Sodhouse Lane. The harvest declined from 250 in 1982 to 100 this year due largely to poor production. Hunter numbers also declined 35 percent because State Highway 205 was closed. This made the hunt area a 55 mile drive from Burns, the only population center in the Harney Basin. Fresh snow greeted hunters opening day and excellent weather conditions prevailed for most of the season.

9. Fishing

Fishing seasons on the refuge coincided with the ODFW trout season. There are two separate fisheries on the refuge. Rainbow trout are the main quarry on the Blitzen River in the P-Ranch area (see G.12). Rainbow trout are also the main quarry in Krumbo Reservoir. However, largemouth black bass and crappie were also available (see G.11). Twenty-five fishermen were present for opening day at Krumbo Reservoir. They caught an average of one, 12-18 inch rainbow per 5 hours of fishing time. Fishing accounted for 13 percent of Malheur's visits.

11. Wildlife Observations

An estimated 30 percent of the visitors participated in this activity. The majority of our repeat visitors drive through the refuge unassisted to observe cranes, deer, geese, swans, etc. A bobcat put on quite a show for headquarters visitors from late May through June. He may have been one of the most photographed mammals on the refuge.

A docile bobcat provided headquarters visitors with a real photographic treat.

BDE

17. Law Enforcement

Three Bend area men who were charged with shooting deer on the refuge in 1982 appealed their conviction to the Circuit Court in 1983. However, They pled quilty the afternoon before the trial and were assessed fines totaling $1,500 plus court costs.

Two local men were cited under the Archeological Resources Protection Act of 1979 (ARPA). They were apprehended on February 4 by Brad Ehlers and Dave Paullin. One man was seen from the air in a routine survey flight. This individual was observed hiding in a freshly dug hole with a screen and pulaski near him. The other individual was later linked to the site by his shoe imprint. They were both charged with two felonies each, a violation of ARPA and damage to government property (digging).

Brad Ehlers spent many days guiding witnesses and the U.S. Attorney to the site for case preparation and evidence collecting. Ken Harrington, Special Agent, Klamath Falls, and Brad also appeared as witnesses at the Grand Jury Hearing, three Defense Motion Hearings and at the four-day trial held at the Federal Court Building in Portland. Dave Paullin also served as a witness at the four-day trial. Assistant U.S. Attorney Chris Rogers handled the government's case.

The Grand Jury returned a true bill and all defense motions were denied at the hearings. The most important defense motion denied was the change of venue to Burns or Pendleton where sympathetic juries were sure to doom the case.

The defendant that was not seen on the site finally accepted the governments plea bargain. He pled guilty to a misdemeanor under ARPA. He will be sentenced on April 16, 1984 in Federal Court in Pendleton. The maximum sentence he could receive is one year and a $1,000 fine. The other defendant was only found quilty of damage to government property during the Portland trial. He faces maximum penalties of a one-year sentence and $10,000 in fines. He will be sentenced on February 13, 1984 in Portland. Although these sentences are somewhat less than Chris Rogers expected, it is a start towards curtailing illegal archeological digging on the refuge and other nearby federal lands. It also represents the first ARPA conviction in this judicial district.

State Trooper Kim Reaney volunteered to conduct regular patrols of the refuge. His efforts were welcomed and appreciated.

Table 21 summarized violations of state and federal laws that occurred on the refuge in 1983.

Table 21. Convictions Resulting from State and Federal Apprehensions on Malheur NWR, 1983.

Violation	Number	Fines
Take deer in closed area (State)*	3	$1552
Archeological Dig (ARPA)	1	Pending
Damage to Government Property (archeological dig)	1	Pending
Chumming - fish (State)	4	$ 104
Fishing without a license (State)	6	$ 85
Take waterfowl in a Closed Area (State)	2	$ 70

* Cited and processed by the Oregon State Police (Game)

I. EQUIPMENT AND FACILITIES

A cindered driveway was replaced by a sidewalk at Quarters 2.
DGP

1. New Construction

A yard fence, sidewalks and patio were built at Quarters 2. A temporary electric fence was contract-built along the west side of the NW Big Sagebrush Field to prevent cattle trespass on land burned by the Eagle's Nest wildfire.

2. Rehabilitation

Contracts were drawn up and awarded for three major rehabilitation projects. Two projects, Krumbo Dam and headquarters septic system, were Accelerated Works Projects. Bucharoo Dam was funded from reprogrammed FY83 funds.

Krumbo Dam was finally rehabilitated by McManus and Son Construction in November. The dam suffered severe erosion damage in 1979 when an upstream dam, Kern Reservoir, broke and inundated the refuge reservoir. Approximately 23,000 cubic yards of dirt were moved to rebuild the back slope of the dam. A new toe drain was also installed. Total cost was $187,637.40.

A $94,619.00 bid was awarded to Bart and Associates to rebuild the Bucharoo Dam. Construction will be delayed until 1984, because the radial gates were not readily available this year.

A $28,300.00 bid was awarded to Heaven's Gate Construction to rehabilitate the sewer system at the headquarters. Work will commence in 1984.

Flooding during May-June caused widespread damage to roads and dikes. Approximately three-quarters mile of Blitzen River dike and interior dikes along East Grain Camp Field were raised and widened. Two large levee breaks on the Blitzen River along the Bailey and West Swamp fields were filled and compacted. Two more levee breaks remained unrepaired at year's end. A muskrat hole in the Center Patrol Road/levee on the north side of Wright's Pond caused a 100 foot hole to develop. The hole was filled and the road was raised and graveled. Approximately 200 yards of Witzel Lane west of the river bridge were raised and rip-rapped to prevent flood water from inundating the road and washing it out.

Approximately three-quarters mile of boundary fence was rebuilt after it was burned by the Saddle Butte wildfire. One mile of fence was rebuilt along the east side of the Larson Field. The original fence was purposely burned during a prescribed burn.

3. Major Maintenance

Sixteen ditches in the East Grain Camp field were cleaned with a pull-blade. Several spoil banks in the East Buena Vista, Larson and West Grain Camp fields were leveled to facilitate seeding and driving on the bank tops.

The drain ditch along the north side of East Buena Vista Pond was cleaned to facilitate drainage prior to farming in 1984. A dragline was used to clean the Long Barn ditch from the P-Ranch to the South Meadow Field to enchance irrigation management. Irrigation ditches were cleaned in the Barley, Warm Springs and Dry fields.

Flooding during May-June washed gravel from approximately 3 miles of the Center Patrol Road. Areas south of Witzel Lane, S-Curve, and Wright's Pond were resurfaced with pit-run gravel, crushed rock and cinders. Numerous rock checks that were washed out by high water were replaced to facilitate irrigation of wet meadows.

Over a mile of the Center Patrol Road was graveled in the vicinity of Rattlesnake Butte. Previously, this section of road had very little gravel on it.

Interior walls were painted at the P-Ranch, Double-O and Q-2 residences. In addition, three bedrooms were paneled at the P-Ranch.

The exteriors of Q-9 and Q-2 were painted. The trim and shutters were painted on Q-452. The pump house at the Double-O was also painted. YCC enrollees painted the gables of the old and new offices and the museum.

4. Equipment Utilization and Replacement

A John Deere 750 track dozer and a 300 gallon "Bean-type" trailer sprayer were received, compliments of the FY82 fire equipment fund. A 40 ton double-drop trailer and another 300 gallon trailer sprayer were purchased with FY83 fire funds and received in 1983. These

sprayers, each equipped with two hand sprayer wands, will be stationed at the Double-O and P-Ranch substations for wildfire control and prescription burns.

A 13 foot Coleman canoe was bought to replace a well used 15 foot Gruman canoe. Two Bolens 42 inch articulating riding lawn mowers were received and will be stationed at the P-Ranch and at headquarters. Substation maintenance capabilities were greatly expanded with the purchases of three arc and three acetylene welders.

Two track-mounted cranes (Koehring and Bay City) were received as surplus property. Both are 3/4 yard machines with 40 foot booms. The Bay City crane will be transferred to Columbia Refuge as soon as transportation is arranged.

5. Communication Systems

Two-way radios are mounted in most vehicles, with a base station in the office at headquarters. This system has saved many man-hours and made more efficient operation of this vast refuge. Good radio coverage is afforded the entire refuge, except for a few areas near Frenchglen, which are shadowed in canyons. Repair and maintenance of our system is performed under contract by the Burns District BLM radio technician. This arrangement has worked well and repairs are done in a prompt and efficient manner, on an acutal cost reimbursable basis plus administrative overhead.

Three new G.E. 16-channel programmable mobile radios were purchased with fire maintenance funds. These radios will be installed in our primary fire management vehicles. The radios will be programmed to include the refuge and BLM fire frequencies. This will allow us to communicate with the BLM pumpers and helicopter during wildfire control. In addition, two portable G.E. programmable radios were received and will be used by fire crews.

The refuge A.M. information radio system was repaired; however, it was not installed this fall, because the installation site was under water. The radio has been used in the past to inform visitors of hunting and general information.

6. Energy Conservation

Six inches of fiberglass insulation were installed under the floors of Quarters #2, #9 and #452. The floors of Quarters #8 and #39 were not insulated because of water standing in the crawl spaces. Rock wool insulation was blown into the exterior walls of Quarters #8, #9, #14 and #39. Quarters #452 has wall insulation and the walls of Quarters #2 and #97 can not be insulated because they are constructed of 18 inch thick stone.

Set-back termostats were purchased and will be installed in the headquarters and all residences in 1984.

Vehicle mileage over the last 5 years is presented in Table 22. The increased mileage this year can be attributed to: 1) sandhill crane radio telemetry study, 2) Double-O predator study, 3) increased use of truck-tractor pulling a newly acquired belly dump trailer to gravel roads, 4) increased road and dike rehabilitation caused by severe flooding, 5) increased travel to coordinate emergency forage program and other flooding problems, 6) round trip to Burns for supplies and vehicle maintenance increased from 64 to 110 miles because of flooded roads, and 7) increased biological monitoring of the refuge.

Table 22. Vehicle Mileage Usage, Malheur NWR, 1979-1983.

Year	Mileage	% Change
1979	165,939	---
1980	143,400	-14
1981	111,292	-33
1982	137,320	+22
1983	172,050	+25

J. OTHER ITEMS

1. Cooperative Programs

Refuge personnel assisted the Soil Conservation Service (SCS) with the Steens Mountain snow surveys in January, February and March. SCS forecasts derived from these snow surveys give data upon which to base irrigation plans in the Blitzen Valley.

Weather data was recorded at four locations on the refuge throughout the year. Evaporation readings are taken at headquarters in addition to the routine weather data.

Bald eagle roost counts were completed cooperatively with BLM, ODFW, USFS and Oregon State University. The otter transplant was a cooperative effort with ODFW (Bend and Burns) and the Oregon State Police (Game). Breeding bird surveys were completed for the FWS Patuxent Wildlife Research Center.

Wildfire suppression was undertaken cooperatively with BLM. Numerous contacts were made cooperatively with the Corps of Engineers, U.S. Geological Survey, and local governments concerning the high water levels. Manager Mazzoni instigated an Emergency Board, consisting of FWS, SCS, BLM, ASCS, County Court and local ranchers, to allocate available forage.

The annual meeting was held with Malheur Field Station directors Ethen and Mary Perkins. Annual schedules and mutual objectives were discussed.

Refuge personnel attended the annual Government Interagency Meeting in Burns. Participants included USFS, BLM, ODFW, SCS, ASCS, USDA-Squaw Butte and Harney County. Brad Ehlers presented a program on the white pelican studies, the river otter release and the Blitzen Valley upland game hunt. Dave Paullin presented a biological summary for the field season.

The refuge cooperatively studied white pelicans with The Nature Conservancy and ODFW. The Greater Sandhill Crane Telemetry Study was partially financed by ODFW nongame funds.

At our request, the U.S. Geological Survey established a continuous-recording water gauge on Cole Island Dike in Malheur Lake. Unquestionably accurate lake levels are now available for public dissemination.

An effort to biologically control Canada thistle with the weevil Ceuthorhynchus litura was continued. Last year's release on the bank of Bridge Creek was successful. Sara Rosenthol, USDA regional entomologist, found several of the larvae in thistle stems in midsummer. The weevils had moved up to a hundred feet through a thick stand of Canada thistle.

The weevil release is a cooperative effort between the Oregon Agricultural Department, the Harney County Agricultural Extension Service, the USDA and the refuge. More releases will be necessary to cover major infestations throughout the entire refuge.

2. Items of Interest

A briefing and over-flight of the refuge was given to Director Jantzen, Steve Robinson of Legislative Service, ARD DeBates and District Supervisors Doebel and Waddell. These gentlemen now have a better understanding of the flooding impacts and why there is so much political controversy in the basin.

Monetary Special Achievement Awards were presented to Brad Ehlers, Marvin Jess and Norman Warneke. These employees assumed additional duties in the absence of the principle assistant and in the absence of Maintenance Mechanic Bill Aulbach, a heart attack victim who was on sick leave.

Marvin Jess, Norman Warneke and Brad Ehlers were presented Special Achievement Awards by Acting Refuge Manager Dean Knauer.

DFK

Joe Mazzoni was presented a Monetary Special Achievement Award on June 27 by Regional Director Dick Myshak. Joe was recognized for the professional manner in which he devoted endless hours and energy to accomplish many thankless jobs at Malheur.

Clyde and Arlene Miller transferred from the Double-O substation to the P-Ranch substation.

Mazzoni was active in the Burns Lions Club and Chamber of Commerce. He was also elected President of the Oregon Chapter of the Wildlife Society. Ehlers served as Chairman of the Sodhouse School Board and President of Peace Lutheran Church in Burns. Paullin was active in the Lions Club and the Holy Family Catholic Church in Burns.

3. Credits

Dean Knauer	A, C, D 1-4, E 1 and 5, F 4-8 and 10-13, I, K and editing.
Brad Ehlers	B, E 2-3 and 6-8, F 9, G 11-12 and 17, H 1-19, J 1-3 and photo captions.
Dave Paullin:	E 5, F 1-3, G 1-3 and 6-10.
Gary Ivey:	D 5, G 4-5 and 13-16.
Arlene Miller:	Personnel Review and Assembling.
Dee Ehlers:	Typing

IN	OUT	REFUGE	MANAGER	COMMENTS
3/27/84	4/12/84	Sheldon-Hart Mt.	M. R. Kaschke	Excellent Report.
4/20/84	4/20/84	Modoc	J Melanson	Nicely Done!
4/23/84	5/25/84	Klamath Basin	Robert Fields	
5/30/84	6/11/84	San Francisco Bay	[illegible]	
6/19/84	6/21/84	Sacramento	Joel Miller	Enjoyed it!
6/25/84	6/27/84	Desert NWR	R. Furlow	Nice Country
6/28/84	6/28/84	Salton Sea	L Nelson	Well done
7/30/84	7/30/84	Hawaiian Is. NWR	Jim Kjelmyr	good report! Hi George + Dean
8/14/84	8/20/84	Nisqually NWRC	Bill Hesselbart	Nice job gang.
8/22/84		Lower Columbia River Refuge Cmplx	Jack Kincheloe	
9/10/84	9/14/84	WILLAPA NWR	Jim Hidy	
9/19/84	10/19	Columbian White-tailed Deer	G Hagedorn	
10/22	10/29	Ridgefield	Bruce Wiseman	"5' high and rising" Hang in there
11/16	11/26	Finley	Sekora	
11/27	12/3	AnKeny	Cliff Himmel	
12/6	12/9	Baskett Slough	R. Pettenmaier	
12/12	12/15	Toppenish	[illegible]	
12/21	12/26	Conboy Lake	Harold Cole	Hi all! Good job - as usual
		Columbia		
1/22/85	1/26/85	Kootenai	Larry Napier	Excellent Report - Lots of good work - Amazing water conditions
1/29	2/6/85	TURNbull	Don White	Hi all - Looking good
2/13	2/19/85	McNary	L. Dudley	
2/26	2/26	Umatilla	L Nelson	still well done - but said at closer range L Hi Dean - Brad
3/4/85	3/11/85	Deer Flat	Jim Messerli	
3/27/85		SE Idaho Refuge Complex	Wendy Hall for Chuck Peck	
3/29/85	4/9/85	Minidoka	John Hill	Fine Report!
4-15-85	4-22-85	Camas	Jack Richardson	Greetings!
5-3		Grays Lake	Gene Barney	

IN	OUT	REFUGE	MANAGER	COMMENTS
5/13	5/20/85	Bear Lake	Henry Deutsch	
5-22	5/28/85	Ruby Lake	Jay [illegible]	[illegible]
6-27	7/1	Stillwater	M. LeFever	